OCTOBER 23 1913

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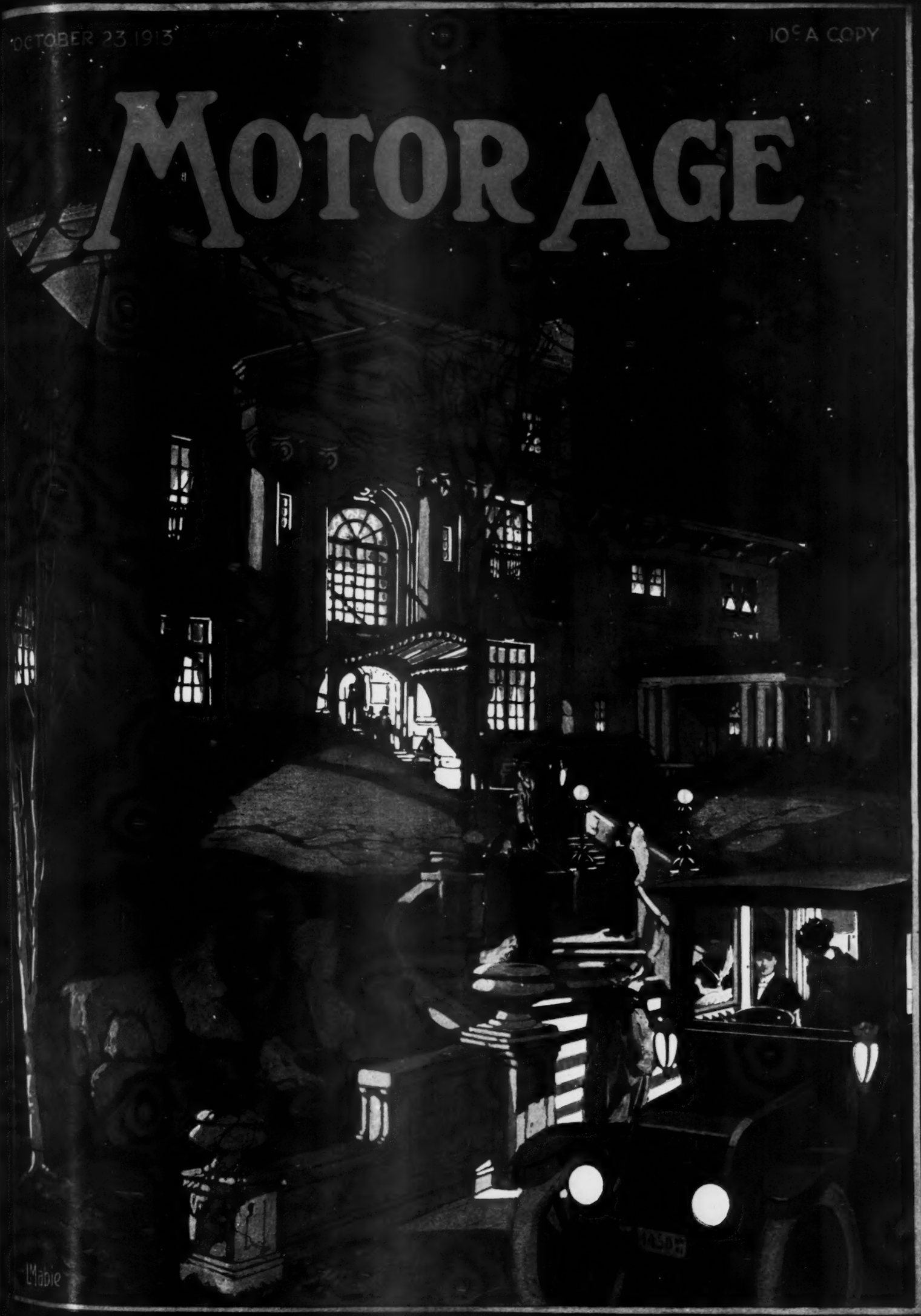
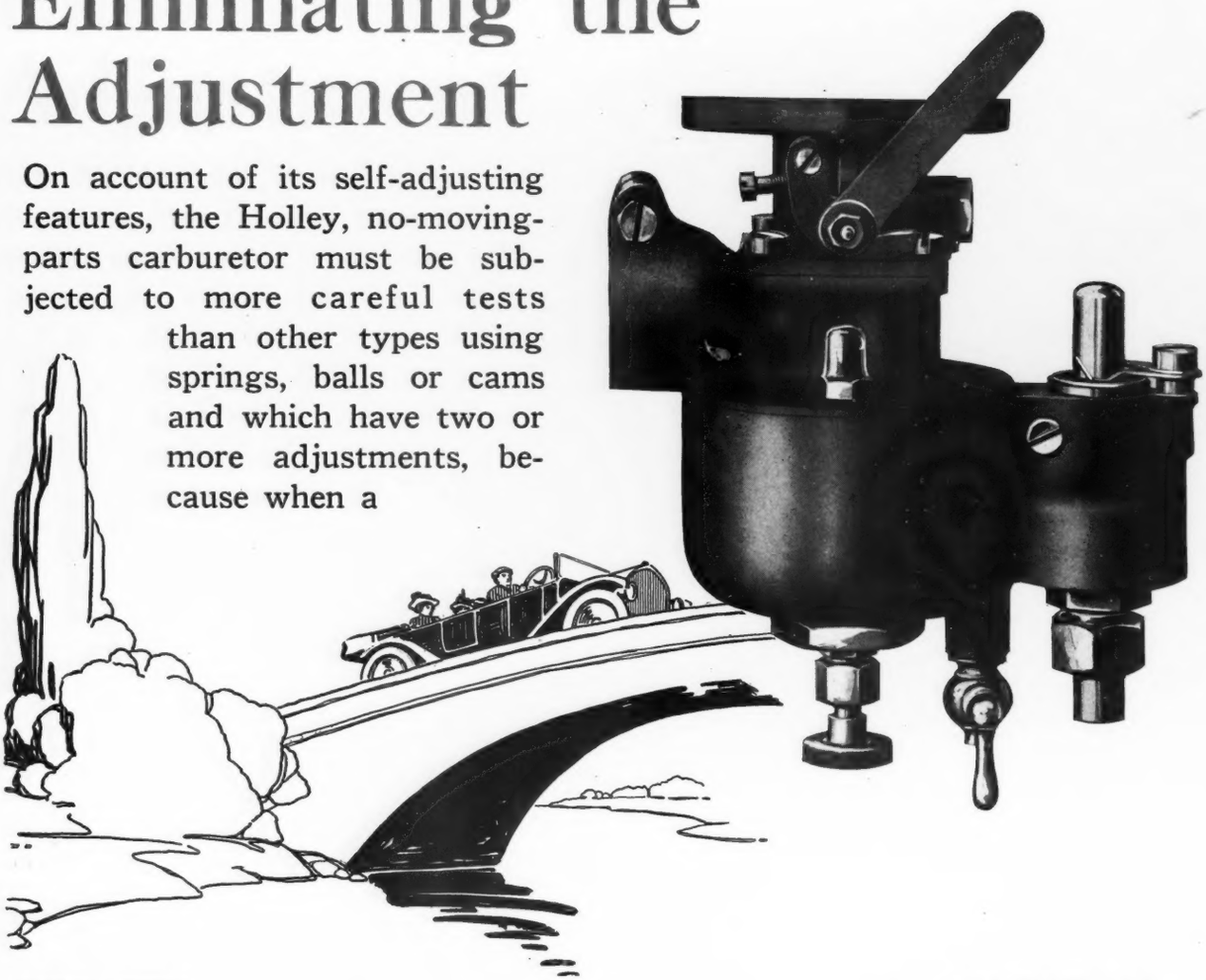
MOTOR AGE



Eliminating the Adjustment

On account of its self-adjusting features, the Holley, no-moving-parts carburetor must be subjected to more careful tests than other types using springs, balls or cams and which have two or more adjustments, because when a



HOLLEY CARBURETOR

leaves the factory, only the gasoline adjustment can be changed—everything else is fixed.

It must give satisfaction first, last and all the time.

That it has, is shown by the fact that over 225,000 HOLLEY carburetors were sold during 1913.

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THE OLD WAY AND THE NEW

No more struggling and straining trying to raise a heavy, awkward top! No more necessity for making all the occupants of the car get out to give you a lift.

One man, unaided, can raise or lower the heaviest top, with the greatest ease with a

Simplex Auto Top Lifter

He can turn the trick in one minute's time, without danger of the top slipping and scratching the body of his car, without danger of breaking the bows.

The SIMPLEX AUTO TOP LIFTER **automatically** carries one side of the top in correct relation to the other side handled by the operator. It **takes the place** of another man on the other side of the car.

EASY THIS WAY!

NO EFFORT

ONE MAN TURNS THE TRICK

The SIMPLEX AUTO TOP LIFTER is made up of two brass tubes, one collapsing into the other. Sliding over the tubes is a rider, in which is a hole for receiving the iron at the bottom of the front bows (see illustration). This telescoping feature permits the device being carried in the tool box.

Always Ready For Use

Anyone can attach the SIMPLEX AUTO TOP LIFTER in a jiffy, the device is so simple.

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The New Automatic Truffault-Hartford Shock Absorber Provides Even Riding on All Roads

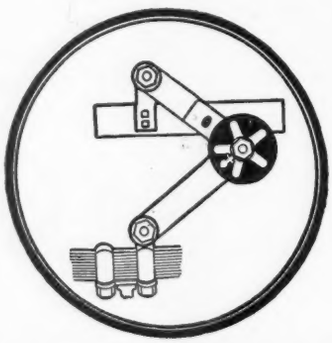
In view of the radical variation in road conditions today, more than ordinary importance is attached to the introduction of the New Automatic Truffault-Hartford Shock Absorber. This latest development in shock absorbers paves the way to easy riding on all roads—in effect, creating the impression of motoring on one continuous stretch of boulevard.

Passing from one kind of road to another has always been attended by an easily perceptible difference in the riding action of the car.

With the perfection of this new type of Truffault-Hartford, the amount of control exerted depends entirely on the character of the roadbeds over which the car is travelling.

On smooth roads the New Automatic offers sufficient resistance to eliminate the slight but noticeable spring oscillation there generated, but without impairing the flexibility of the spring.

The amount of frictional resistance is automatically doubled, however, as soon as the road changes from smooth to moderately rough and the normal action of the spring is so perfectly maintained that the occupants of the car are unaware that the road surface is altered in any way.



There is a third and still greater degree of tension exerted by the New Automatic which is effective in two ways. It preserves ease of riding on even the roughest road and prevents excessive spring deflection and rebound when the wheels of the car strike some road obstruction such as a cross walk, car track or culvert.

All three tensions are self-regulating and self-adjusting and easily set to the proper degree for every kind of automobile spring—from the thin leaved, highly flexible type to the heavy, thick-set type.

No other shock absorber built can compare in efficiency of operation with the

New Automatic

Truffault-Hartford

SHOCK ABSORBER

It is the logical spring control guaranteeing the greatest ease of riding and adding materially to the mileage of tires and to the life of every car part. Price $60 per set of four. Other Truffault-Hartfords $50, $40, $25 and $15. Order by name from your dealer or from any branch.

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MOTOR AGE

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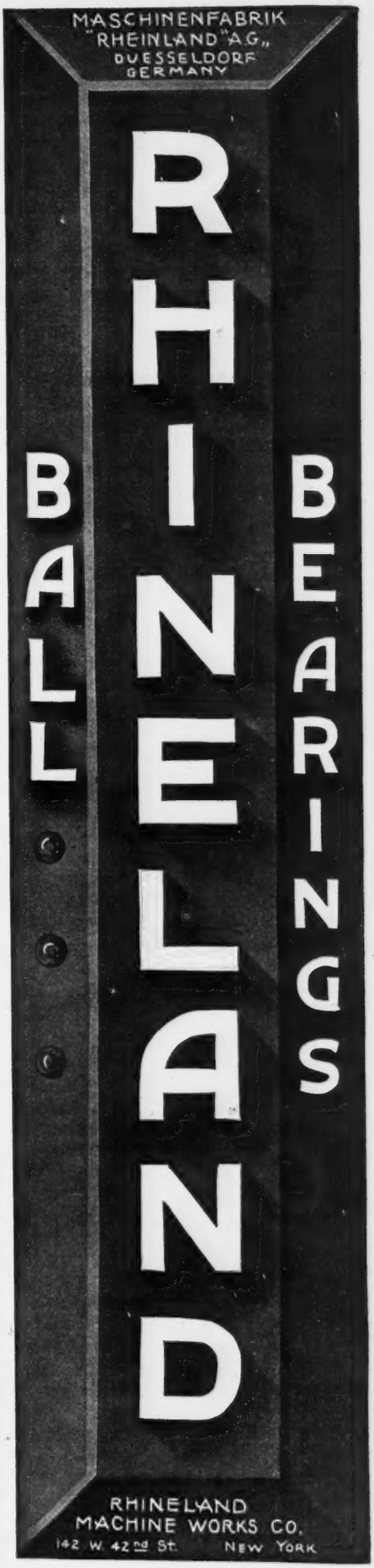


An Electric Starter That Isn't Built In

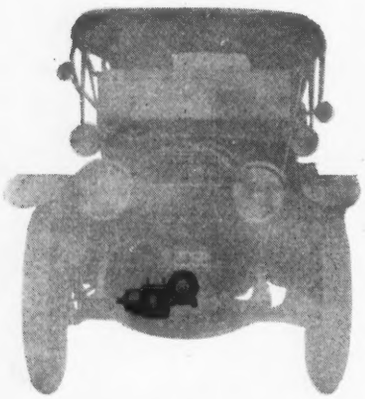
DEALERS—You Can Install the

Disco Universal Electric Starter

On Any Car

THE electric starter, originally a luxury, has come to be a necessity, one coveted by the man who does not have it and who, up until this time, could not have it unless he bought a new car with a built in system.

We offer here, to progressive dealers, the Disco Universal Electric Starter, a readily applied accessory and one that is bound to find instant favor with the big army of car owners who are still "just getting along" with the obsolete gas starter, or, perchance, with the old fashioned crank.



This outfit is simply a small, powerful electric motor, simple, dependable, sturdy and readily applied. Its simplicity insures years of usefulness. Operated by an ordinary storage battery, it will spin the biggest six cylinder motor at the rate of 100 or more R.P.M.—smaller motors as high as 150 R.P.M.

This is an innovation, it is the one system today that can be readily installed on any car, from the smallest to the largest.

It is hooked up to the engine by a worm gear, the most logical and sure method of power transmission known in the electric starter field.

Starting the car is a simple operation, consisting solely in pushing the starting button with the foot, thus starting the engine under all conditions, provided the ignition system is in working order.

Now you know, Mr. Dealer, that practically all of the 1914 cars will appear with electric starters as a big sales feature, but it still remains that in your territory there are scores and perhaps hundreds of high grade automobiles that have either an unsatisfactory starting device or none at all. Owners of these cars are your prospects. They will readily take to the electric self starter as long as it does not involve the purchase of a new car.

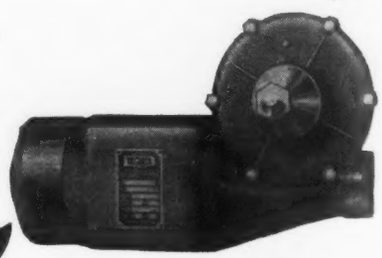
Also consider this. You, as a dealer, will be able to make sales on new starter equipped cars, taking in exchange second hand cars which you can immediately equip with the Disco Universal. Such a car holds a value far in excess of the added amount you spend on such equipment. This ought to appeal to you, as it is appealing to hundreds in the trade who have realized the value of this practical innovation.

You know that the name "Disco" stands for quality of production. This Company has been manufacturing self starters for years, but it was the first one to realize the possibility of such a device as a separate unit—and to turn the possibility into a reality.

Dealers—We guarantee, through you, to your customer, all of the quality that stands for positive action, unvariable action and long life. There is nothing then left to be desired.

We have a proposition that will interest you—one that will cause you to take immediate action in the matter of equipping cars with the Disco Universal Electric Starter. It is a proposition you cannot afford to ignore or overlook.

The details will interest you and you may have them for the asking. Write today.



THE DISCO COMPANY

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MOTOR AGE

The Electric Industry for 1914

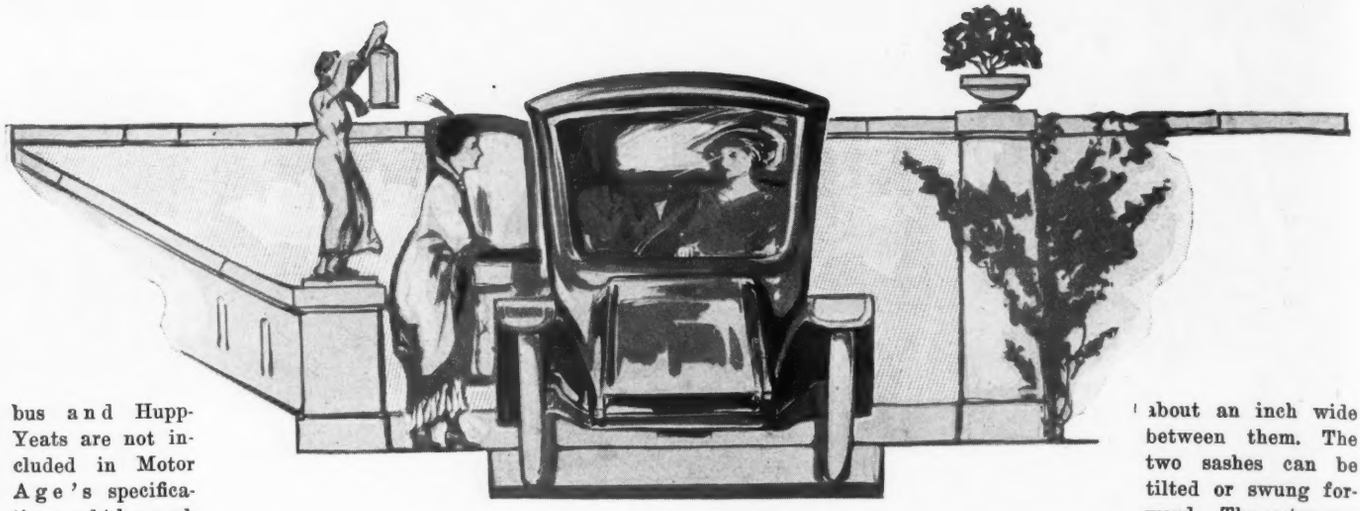
The trend for the coming season, as compiled by Motor Age, shows that makers of electric passenger vehicles are bending their effort toward increased production, lower prices, larger bodies, more window space and deeper upholstery; that the use of worm drive is more general and the use of shaft drive is almost universal; better anti friction bearings are being fitted and that the standard battery practice employs forty and forty-two cells and thinner plates.

By David Beecroft

INCREASED production is the slogan of many electric vehicle makers for next year, particularly in the passenger car line. Some companies are going to increase their output 50 per cent and 1914 will, if present plans are carried out, witness outputs of electric vehicles counted in thousands instead of hundreds.

With increased production will come lower prices, but few concerns have manufacturing facilities to permit of cutting the price to any noticeable extent. It is only when the output gets above the 2,000-mark that manufacturing cost can be lowered. One company has such a program outlined for next year and the cut of nearly $300 in the majority of its models over 1913 prices gives some indication of what may be expected when outputs get into much higher figures. In a word, the commercial aspect of the electric passenger car field is very much like that in the gasoline field, where production and reduced prices have been the watchwords of the most aggressive companies.

The number of concerns building electric passenger types for next season is a little less than those announced a year ago, a few names having been removed from the roster, some because of financial difficulties and others due to varied reasons. Colonial, Church-Field, Colum-



bus and Hupp-Yeats are not included in Motor Age's specifications, although some of these may yet fortmulate programs for next season and be on the 1914 market after all.

While some have dropped, others have changed and new ones arrived. The present-day Tiffany is but the Flanders of a year ago with a new nameplate. The Ward, just out, marks the debut of this company into passenger-vehicle fields although it has been building commercial cars for several years. Today there are eighteen concerns building electrics in quantites, some not marketing over 100 a season and others exceeding the 2,000-mark. It is impossible to estimate what the output of passenger vehicles for this year has been. It might approach 6,000 machines, it might be considerably higher. Statistics are unavailable.

Dual Control a Feature

Dual control must be looked upon as one of the biggest talking points in the new lines, by dual meaning ability to drive either from the front seat or the rear seat, generally two entirely distinct sets of steering and controlling pedals and levers being provided. Where the dual control is listed it is generally confined to one model or two at the most, and these models are invariably five-passenger broughams, limousine types or designated in some case French coach designs. With those listing dual drive the sentiment is general that it will greatly increase in the next few years due to stringent police regulations forbidding passengers sitting in front of the operator. The dual system is an easy solution of this problem.

Against the dual drive can be cited the additional expense, often $100 according to list prices, and the increased weight and added complications. Added weight means a cut in battery mileage and as mileage per charge is the big aim in electric vehicles it is natural to expect that the added weight will be kept down. Grinnell has solved the added weight in that the same steering and controlling parts can be used for either front or rear seat, a fact accomplished by using universal joints which permit of swinging these parts back or forward as needed. The added weight is largely due to extra pedals and necessary connections.

The closed type of electric is coming more and more into competition with the closed gasoline type with its self-starter and electric lights and it will not be surprising to see renewed activity in this type of electric vehicle, and the dual control would seem to be one of the ways in which gasoline competition can be best met.

Electrics in general are a little larger in bodies than this year, the inside measurements frequently showing 4 or 5 inches more space between front and rear glasses. This space is needed in the all-face-forward types in order to give more knee room for the revolving type of front seat for the operator. With this added space there is ample room for front-seat driving and still more room when the front seat is turned to face rearward and settles back against the forward part of the body.

More window space is generally apparent, this being accomplished by larger window space, a desirable safety factor in these days of increased traffic and greatly increased use of motor vehicles. In some makes the actual window space has not been added to but using sashless windows has resulted in practically the same. The sashless window is a leaf from gasoline body building, an innovation introduced 3 years ago. With electrics quietness is an essential and it is not surprising to see anti-rattlers fitted to the windows in the doors of several makes. These little anti-rattlers are simply set screws carried on the window framework and when screwed in rest against the dash holding it rigid.

Clear-Vision Fronts

Before leaving the window aspect of the 1914 electrics attention is invited to the improved methods of clear-vision fronts, one of which is the Hanlon patent used on the Detroit vehicles and apparent adaptations of which are seen on other makes. This device is two glasses forming the upper half of the glass front of the body. One is outside of the other, and if both were closed there would be an air space about an inch wide between them. The two sashes can be tilted or swung forward. The outer one forms an inclined shield for sleet or snow and the inner one can remain closed, or both can be opened. This double-glass idea really gives a clear-vision front for rain storms, sleet storms or snow storms and greatly adds to the all-round utility of the vehicles.

Interiorally the 1914 electric vehicle is a little more palatial than this year. The upholstery is deeper, the proverbial 8 or 10-inch seat cushions now being heard of in several places. Backs of seats are plain rather than tufted and where sides and ceiling are cloth or leather covered the plain covering is more general. Bedfords and whipcords are leaders in interior finish, although Spanish and other leather styles have a good following.

Speedometer Mounting

The fitting of speedometer is much more general than formerly and wherever fitted an effort has been made to subdue them by mounting flush with the wall face. Clocks are becoming accepted equipment and vanity cases, vases, etc., still are in general use. The current-measuring instruments generally are confined to combined volt and ammeters or to some form of ampere-hour meter with an indicating hand which shows at a glance the condition of discharge of the battery.

Becoming technical, if such is permissible with electrics, the chassis in not a few makes has been quite revamped during the last 12 months. Uppermost in this respect is the more general use of worm drive, four companies, Rauch & Lang, Anderson, Baker and Fritchle having taken it up and joined the ranks of Tiffany, which was a leader in this form of rear axle transmission. With the worm-driven axle it is possible to use a relatimely high speed motor, one with 1500 r.p.m. and still use but a single gear reduction between the motor and the rear wheels. This should add to the efficiency of the vehicle and also result in a slight weight reduction. Anderson mounts the worm beneath the axle and R. & L. above the axle. One uses the hour-glass type and the other the parallel or straight-face. Fritchie lists worm drive also.

Shaft-drive is almost universal, only one company listing chain-drive on its regular models, that being Bailey. There are one or two companies that use chain-drive on town cars or other models, but with these few exceptions shaft-drive can be said to hold the entire field.

Shaft-drive must not be construed the same as shaft-drive in gasoline cars, namely in which there is direct drive, or one reduction between motor and rear wheels and that at the back axle. There are several electric makers that use but one gear reduction, but there are more that use two reductions, this being necesary in order to use a high-speed motor. Among those using direct shaft-drive with one reduction are Ohio, Anderson, Waverley, Standard, Chicago and all worm-drive makes. Among those using double reductions are Century, Broc, Argo, Baker and Borland.

Chassis Refinements

Chassis refinements include better antifriction bearings for carrying front wheels as well as for general use in the rear axle. Many concerns point to the use of double-row annual ball bearings or to new types of roller bearings and invariably add that these bearings give easier riding and so conserve the battery current, thus giving a greater radius of mileage without adding to the battery size. These same makers in not a few instances draw attention to the use of ball or roller bearings in the steering gear, thus making it possible to handle the heavier five-passenger models with an ease that equals that of the smaller and lighter types.

With larger vehicles and in some instances faster ones it is essential that brakes be larger and more positive. The majority of the companies have made them larger, the drums greater in diameter and the brake shoes wider. One set is invariably put on the rear wheels, and if present tendencies are continued it will not be long before fitting two sets of mechanical brakes on the rear wheels will be as general in the electric as it is in the gasoline field.

Pedals generally are used for brake application, one pedal having a ratchet arrangement and serving to lock the vehicle much as does the lever emergency brake on a gasoline model. This emergency brake is very frequently interconnected with the current so that its application cuts out the current, making it necessary to bring the controller lever back to neutral before making any speed possible.

Speeds in miles per hour are not any higher on the average than they were this year. Twenty miles per hour is the general speed, although one maker schedules 25 and others 22 and 21. In one model a fifth position is provided on the controller giving 22 miles per hour, but it is necessary to hold the controller lever for this position, and once the hands are off the lever automatically comes to a lower position, giving 20 miles per hour.

The story of battery equipment is one of standardizing on either forty or forty-two-cell equipment, but using thinner plates and more of them to the cell. For example, where eleven plates were equipment in 1913, thirteen plates are used for 1914. Adding two plates has proportionately increased the surface area of the battery, thereby adding to its mileage possibility without increasing the weight. In the thinner plate the active material is thinner, consequently requiring a shorter time to be reached by the electrolyte. The thin plate gives better acceleration qualities and also a higher speed on hills.

No-Wash Type Popular

Besides adding to battery capacity by using the thin plate, the no-wash is met with at practically every factory. This cell has a deep mud space at the bottom of the grids, so deep that there is room for all of the active material to fall from the plates and yet not pile up against them, thereby interfering with their action. With these no-wash cells there is no necessity for washing them during the battery life.

In mounting batteries in the trays in the cars accessibility has been kept in mind so that none of the cells are under the car seats, thereby making it possible when the front or rear hoods are raised to inspect all of the cells, to fill them with water if necessary or to test them if needed. This greater accessibility is bound to result in better battery attention with consequent greater mileage at slightly reduced cost of operation.

Edison batteries are listed by but one company as regular equipment, but are quoted as optional equipment at an extra price by a great many. The Ironclad and Hycap cells are listed by not a few concerns.

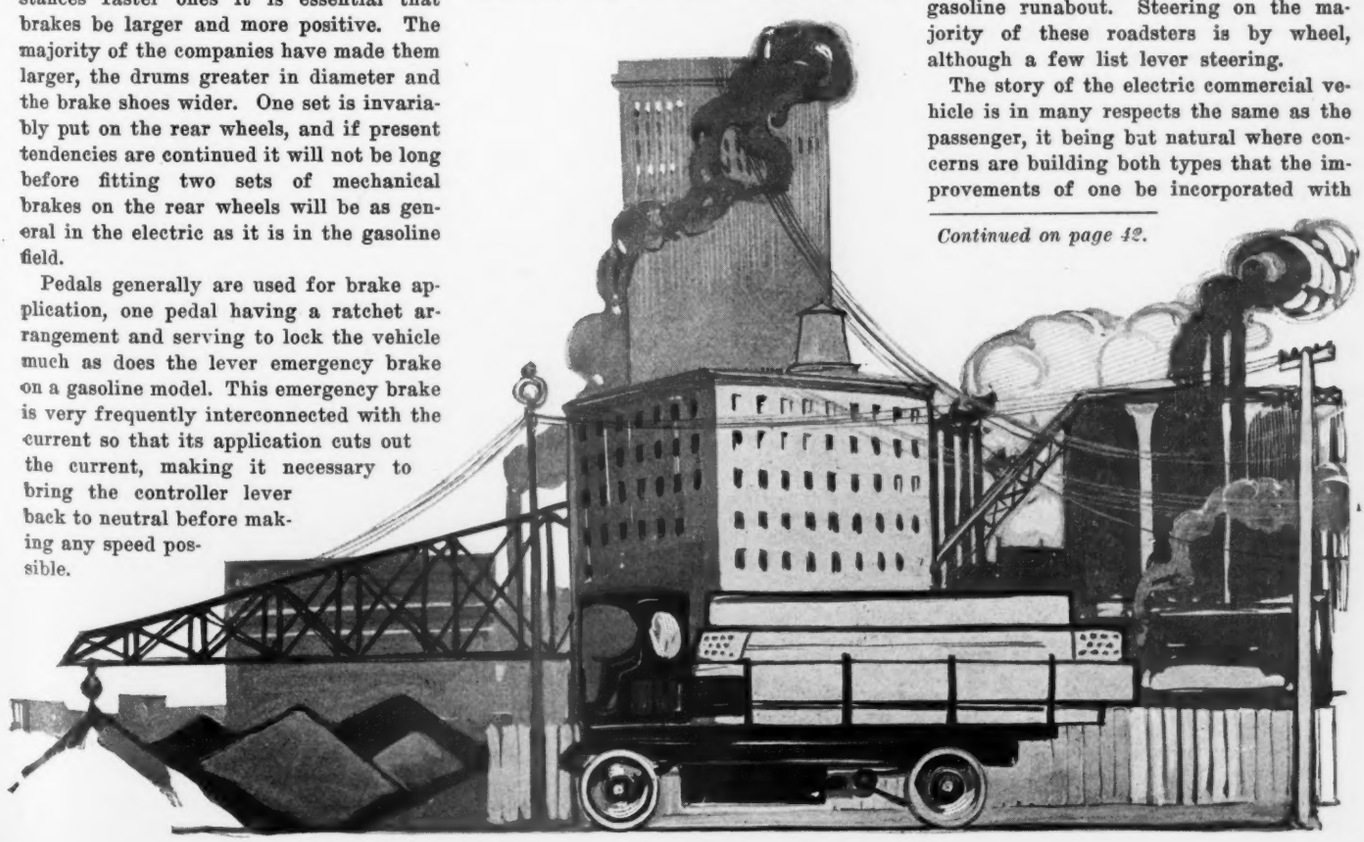
Improvement in Wiring

A general improvement has been made in the wiring between the controller, the battery and the motor. It is becoming general to inclose these wires in conduits and to use larger section wires. Makers are grasping the merit in compactly grouping the electric units so as to reduce the length of wire and consequently current drops. Wires of larger cross section are being used and more copper is found in the controllers of many cars. All of these improvements mean greater battery mileage.

The electric roadster has not gained in popularity as was expected, although 1914 announcements would tend to show special preference for it by one or two of the older companies. Seven of the eighteen companies are listing roadster types, which range in price from $2,500 to $2,900. These concerns are: Argo, Bailey, Borland, Buffalo, Detroit, R. & L. and Baker. In some cases the battery equipment is fitted for greater mileage and higher speeds. There is a tendency, particularly in the new Baker, to follow the lines of the stylish gasoline runabout. Steering on the majority of these roadsters is by wheel, although a few list lever steering.

The story of the electric commercial vehicle is in many respects the same as the passenger, it being but natural where concerns are building both types that the improvements of one be incorporated with

Continued on page 42.

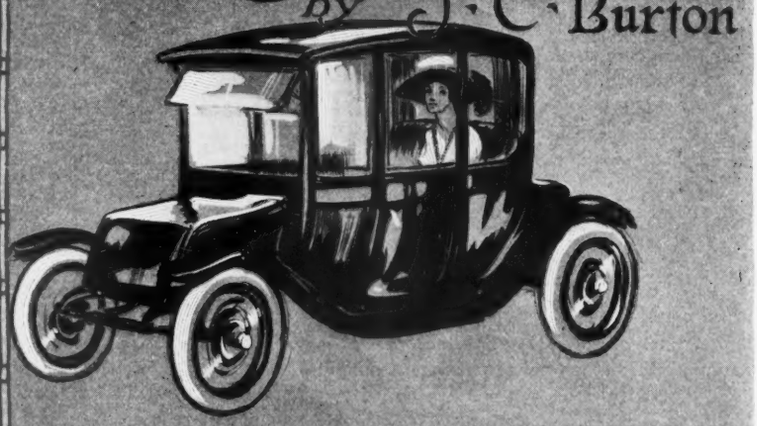


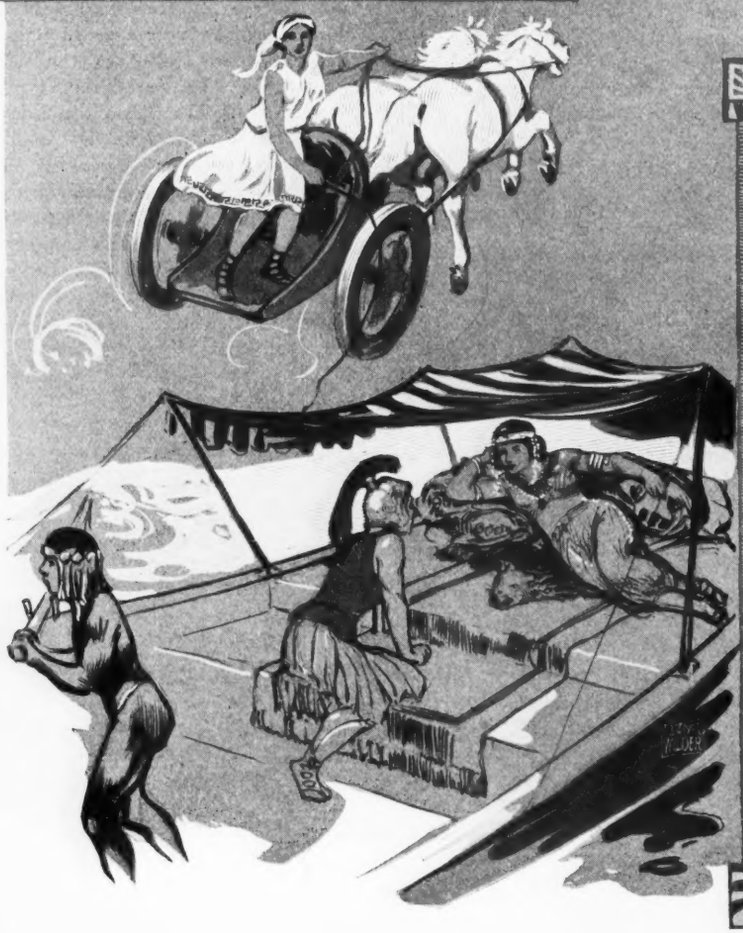
TO BEN FRANKLIN

by J. C. Burton

She came down the boulevard gliding
In brougham electric'lly run:
One look—and I felt myself sliding,
My head with Love's dizziness spun;
For I thought was there ever more witching
A face or a brighter blue eye?
And I recalled the charmers and bach'lor disarmers
Who rode in the cent'ries gone by.

I saw through the haze of the ages
A beauty of Solomon's day:
"A mighty good catch," said the sages
Who made a most careful assay.
Yet I wept for the fair queen of Sheba
Who had but a camel to drive
When she wished to go shopping and sale counter hopping
To squander ten shekels or five.





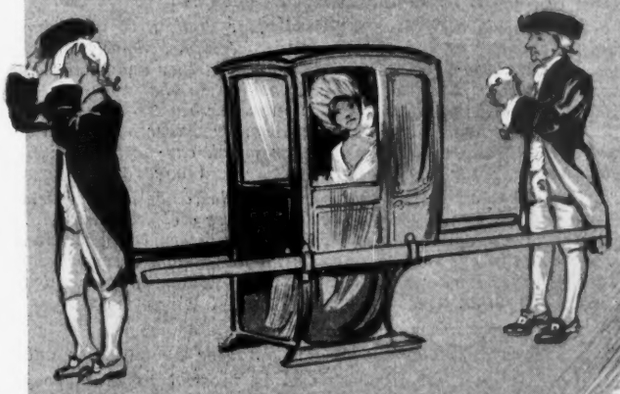
Then Helen of Troy passed before me,
Once voted by Venus most fair,
The cause of a struggle quite gory
When "One Round" Achilles was there
With the side-step, the punch and the knockout;
But I would not follow her far:
When this maiden alluring desired to go touring
A chariot served as her car.

I viewed Cleopatra in wonder,
The coquette and queen of the Nile,
Who, hearing the war god Mars thunder,
Won bold Anthony with a smile:
But my sympathies all were for Cleo
Who, wishing to tear up the links,
Had to resort to boating and went slowly floating
To Bogey's lair down by the Sphinx.

and HIS KITE — THANKS

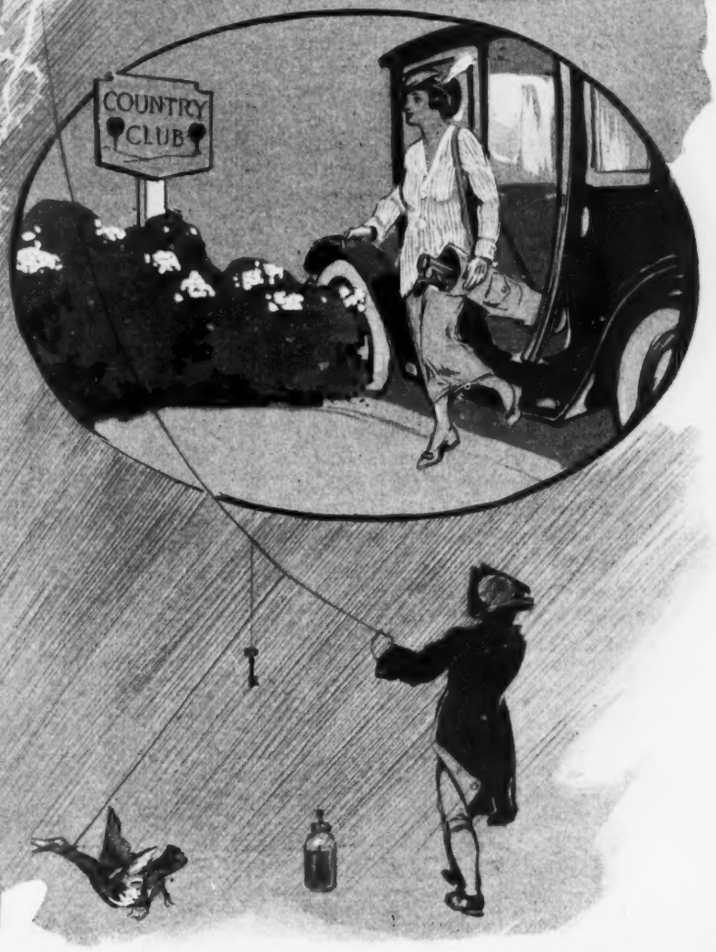
Marie Antoinette smiled upon me
And promised her Louis to jilt;
Her wiles only filled me with ennui
And harsh seemed her amorous lilt;
For the beauty of France was a piker—
I grant her a belle dame, of course—
But on p. m. processions to tea-drinking sessions
She rode in a coach aft a horse.

Next passed in review Dolly Varden,
With tresses of sun-haloed brown;
The flower most sweet in Love's garden,
In London, the toast of the town:
And she went to The Globe ev'ry Wedn'sday
When John Drew or Hackett were there,
But to matinee sobbing and love scenes heart-throbbing
She rode in a man-carried chair.

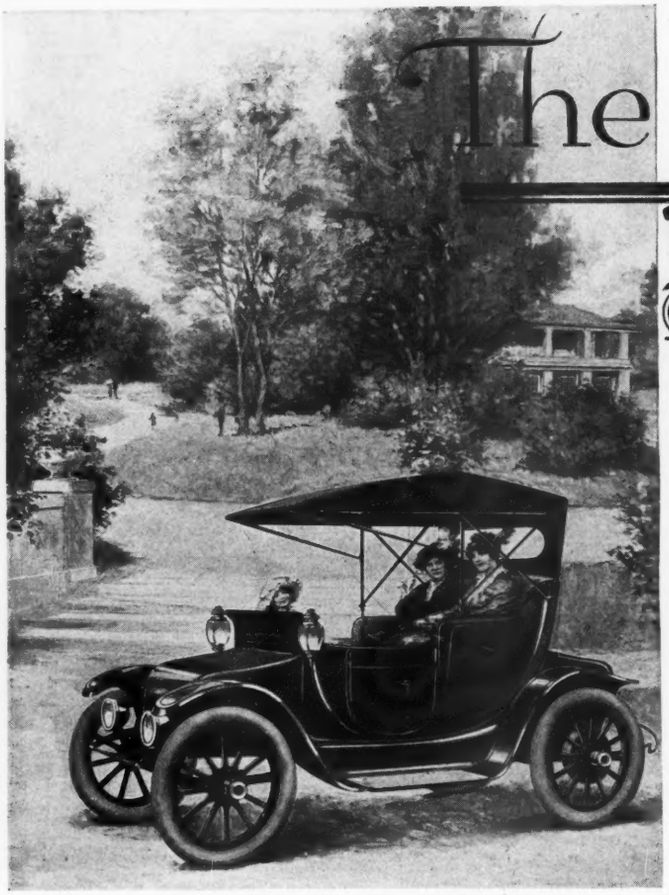


She came down the boulevard gliding,
Perhaps to the matinee bound,
Or else she was leisurely riding
To country club down by the Sound
Where she'd play eighteen holes with a suitor—
I jealously wished I were he—
Being consigned to Hades, I envied the ladies
Who gossipped with her o'er their tea.

She came down the boulevard gliding
And Helen of Troy was a hag;
Fair Cleo was switched on a siding,
And Antoinette's charms were but slag.
So commend not to me the great beauties,
The conquests of old don't recite:
The electrical charmer is no false alarmer,—
I'm indebted to Ben Franklin's kite.



The Passenger



MODEL 44 DETROIT VICTORIA, $2,300

ELECTRIC passenger vehicles for the new season are characterized by a number of features which make for greater comfort in driving and also for a greater radius of action without necessitating recharging of the battery. A study of the productions of the different electric car makers for 1914, as described in the following pages, will show a particularly strong trend toward control arrangements which permit the car to be driven from either the front seat or the rear seat. The reason for this dual control, as it has come to be known, is the endeavor to provide the safety of the front drive which is demanded by the ordinances of some municipalities with that companionability which can only be obtained by the rear drive when but two persons are occupying a four- or five-passenger car. Legal restrictions in some cities and states prohibit any passenger riding in front of the driver. This until recently has been the usual arrangement where three or more passengers were to be carried in the inclosed vehicles.

To overcome this difficulty, the duplex, or dual, drive is being introduced by nearly every company and is accomplished in a variety of ways. One or two makers have gone even further and made the front and rear control mechanism interlocking so that only one of them may be in use at a time, thus preventing passengers from meddling with the control of the car. Another maker has obtained the dual control with a single mechanism which can be swung into two positions, one for the front-seat drive and one for the rear.

There is much more glass in all of the inclosed bodies, sashless windows being very much in favor. This gives a clearer vision for the operator of the car and also adds to its external appearance. More roomy bodies are the rule, the inside dimensions are generally from 3 to 4 inches longer and are that much wider to give more room for the front-seat passengers.

ARGO

A DISBELIEVER in yearly models, the Argo Electric Vehicle Co., announces a new series of electrics which consists of two chassis of 108½ and 110 inches wheelbase respectively and with only detail refinements over the models of the previous series. Upon the 108½-inch wheelbase chassis are mounted two body styles, a roadster and a brougham. The 110-inch car takes a limousine body. The only important mechanical change which has been made in Argo electrics has been the substitution of Hess double-row bearings on the inside and outside of all wheels. The previous series has single-row bearings. The bodies have been brought up to the minute and made more luxurious by detail refinements, the molding having been given especial attention.

The equipment in Argo electrics has been changed by the addition of a number of accessories. The new series is equipped with a clock, hat carrier, parcel carrier and two reflex mirrors, all these appurtenances being absent in the previous models. The feature of having every window—one which may be opened—is retained in the cars.

All Argo electrics are equipped with Exide batteries of forty cells, with an ampere hour capacity of 135 and with these batteries the cars are capable of traveling between 75 and 100 miles on a charge. The batteries are carried on the forward part of the frame.

The Argo drive perhaps is the most interesting part of the chassis. The Westinghouse series motor is directly in front of the rear axle and drives through herringbone gears to the rear axle. The driving gear is of the bevel type and the axle a floating.

The foot control on Argo electrics has been a feature for some months past. By this method a pedal is used instead of a lever for obtaining the various speeds. The foot pedal operates a controller and when the pedal is pressed to first speed position the controller passes current from twenty cells in multiple to the motor. For second speed the same twenty cells with a series connection deliver their current to the controller; third and fourth speeds utilize the entire forty cells, in the former case the connection being multiple and in the latter series.

The advantage claimed for this type of control is that it is simple, easy to operate and leaves the driver's hands free to take care of the steering wheel. Another feature of the Argo foot control is that no harm is done, if by accident the pedal should be placed in fourth-speed position when the car is about to start. In this event a switch is thrown which inserts resistance into the circuit and thus the high voltage from all forty cells cannot in any way harm the motor, or start the car with a jerk. Two reverse speeds are provided.

The wheel steer is another standby for the Argo for 1914. The steering is done from the left side. The four-passenger roadster is listed at

BAILEY MODEL F ROADSTER, $2,900

Electrics of 1914

Battery capacity is being increased in nearly every case, and where more cells are not being added thinner plates and more of them are being used. Batteries generally are of the no-wash type; that is, with a sufficient mud space under the grids to accommodate all of the active material in them so that the grids do not have to be washed to prevent chemical action from the deposited active material.

Tires are larger on many models, but there is no greater tendency towards the use of pneumatics. The wheelbases on the new models are from 2 to 3 inches longer than on the old ones. This is to be expected in consideration of the general increase in the size of the bodies.

Shaft drive is general, except in one or two instances, and the worm gear reduction at the rear axle has a number of converts. Brakes are invariably larger, and it is becoming customary to fit two sets of mechanical ones. There have been numerous improvements aside from the duplex or dual drive. One of the improvements is in having the emergency brake automatically cut out the electric current so that there is no opportunity of draining the batteries by attempting to run with the brakes on.

Tufting of ceilings and panels and so on is not carried to the extent that it was formerly. Whipcord seems to be most popular for upholstery work. In accoutrements, milady's comfort has been looked to to a greater extent than heretofore in the way of toilet articles and similar fittings. One maker has gone so far as to make a silk umbrella part of the regular equipment.

There is a continual growth of the snappy, speedy style of roadster, and the effort seems to be in several instances to approach as nearly as may be the general lines of the faster gasoline-driven roadsters.

MODEL 45 DETROIT FIVE-PASSENGER BROUGHAM, $2,800

$2,500, the four-passenger brougham at $2,800, and the limousine at $3,250. At the time of the New York electric show announcement will be made by the Argo company to the effect that these prices will be increased.

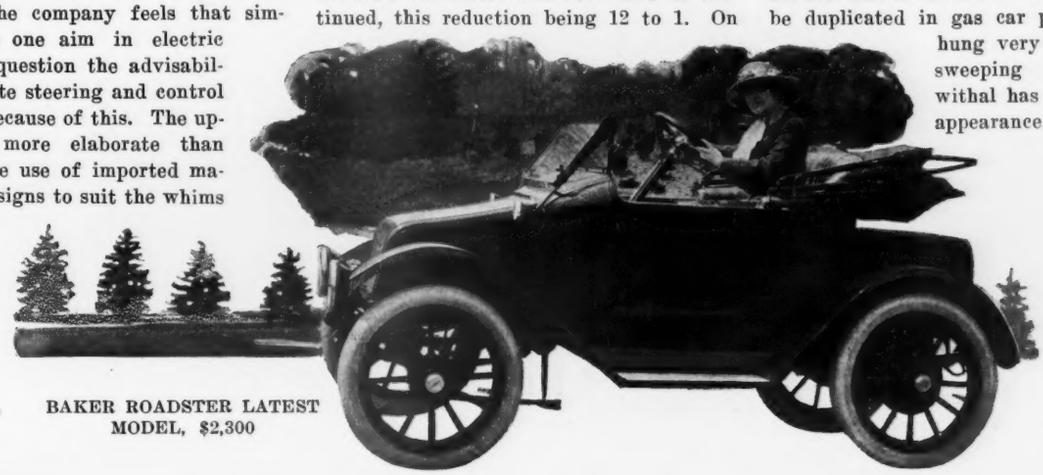
BAKER

THE Baker Motor Vehicle Co. a long time ago discontinued the annual model conception, its policy in place being to incorporate improvements in its vehicles at any convenient time whether in the mid-season or at the end of the season. In accordance with this policy the bodies of its present passenger line are refined by the elimination of sashes from the window glass and a slight softening of the roof line. The company feels that simplicity is the one aim in electric vehicles and question the advisability of duplicate steering and control mechanisms because of this. The upholstering is more elaborate than heretofore, the use of imported materials and designs to suit the whims of the individual buyers being a feature of this part of the Baker policy.

Present policies concerning battery equipment and support are continued, the equipment differing materially according to the type of car, the runabout which requires great mileage representing one extreme, and the large brougham calling for 40-cell equipment, another. Thin-plate cells are used in the runabout, and Hycap Exide on all other types. Batteries are placed under hoods which are hinged and readily opened, and the trays arranged for easy removal. When the hoods are raised all cells are open for inspection.

Some years ago the Baker company adopted a high-speed motor and continues to use it in practically the same form. In its bevel-driven car the double reduction between the motor and rear axle is continued, this reduction being 12 to 1. On the new bevel-drive brougham the Lanchester-Daimler worm is used for reduction at the rear axle, the reduction ratio being 11 to 1.

The roadster, one of the new models, which is capable of 30 miles per hour, is well suited for general use. It has the battery disposed fore and aft in the usual form under curved hoods.



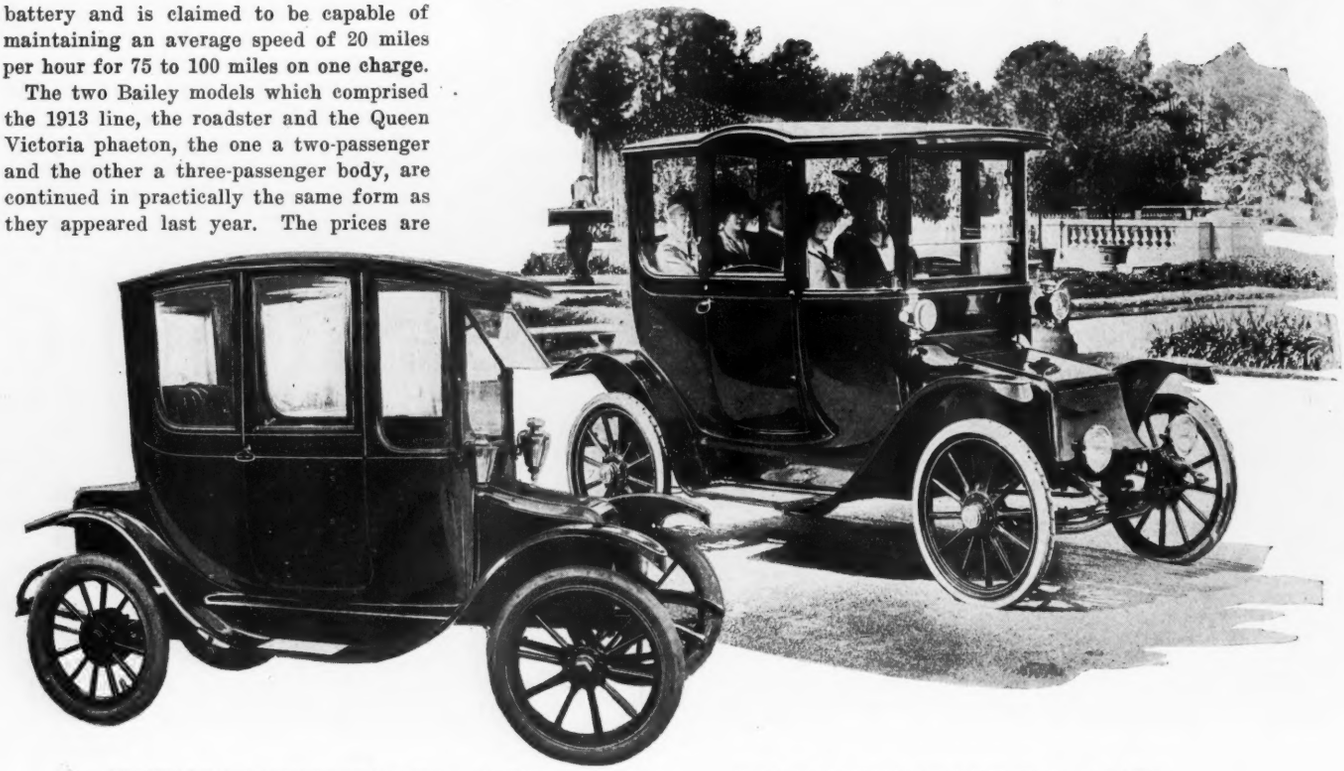
BAKER ROADSTER LATEST MODEL, $2,300

BAILEY

THE feature of the electric vehicles produced by the S. R. Bailey Co., Boston, Mass., is the new model F Bailey electric roadster, which recently made its appearance. This is an open car, which follows gasoline car lines rather closely, yet with artistic curves of its own that hardly could be duplicated in gas car practice. It is hung very low with long sweeping fenders, and withal has a very speedy appearance. The car has greater battery space and consequently greater possibilities of speed and mileage than the ordinary type. It is equipped with the Edison

battery and is claimed to be capable of maintaining an average speed of 20 miles per hour for 75 to 100 miles on one charge.

The two Bailey models which comprised the 1913 line, the roadster and the Queen Victoria phaeton, the one a two-passenger and the other a three-passenger body, are continued in practically the same form as they appeared last year. The prices are likewise unchanged, the roadster selling at $2,500 and the phaeton at $2,600. The new roadster model is listed at $2,900. This car has a rather long wheelbase for electrics, 112 inches.



STANDARD'S LATEST TYPE COUPE, $1,990

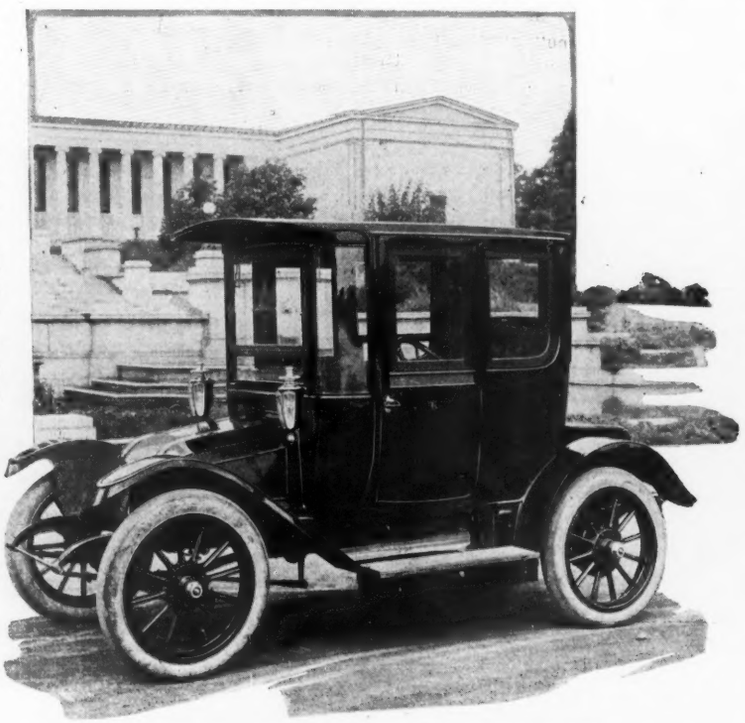
FIVE-PASSENGER CHICAGO COUPE, $3,000

Under the front and rear hoods and underneath the floor is an unusually large carrying space. The high-speed possibilities and easy riding of the car are said to to be due to the somewhat remarkable suspension and the low position of the center of gravity. The clearance from the ground, 12 inches, is greater than that of the average touring car, but the center of gravity is less than 18 inches from the ground. The front end of the car is hung above and in the middle of a long cross spring extending lengthwise almost the entire length of the front axle, and this point of support, at which there is a ball-and-socket joint, is well above the center of gravity.

A curious and valuable effect claimed for the suspension of the body at a point above the center of gravity is the tendency of the car to lean inward instead of outward when going round a corner. The rear of the body or chassis is hung from two points at the top upon two elliptic springs running lengthwise of the body and close to it. All essential features of the suspension are original. The frame is of wood construction, strongly braced with steel. This frame is in itself both the body and the battery compartment as well. Simplicity and accessibility of every part of the car and its equipment are features. By lifting the hinged metal hoods, the motor, the controller, all the driving mechanism and every cell of the battery are open to easy inspection. This makes for quick and easy adjustments.

Methods of control on this roadster model are the same as those on previous Bailey models. These methods include the wheel steer and a controller lever mounted on top of the wheel in a manner similar to the throttle control on a gasoline car, an electric vehicle feature original on the Bailey and easily moved by a finger of either hand. There are six speeds forward and three reverse speeds. The brakes are controlled by two adjustable foot pedals, one pedal controlling the brakes on the rear hubs and the other the countershaft brake.

The Bailey roadster is especially designed for the use with the Edison storage battery, so as to take full advantage of its remarkable characteristics. The rated capacity of the battery is guaranteed for 4 years. The motor in the roadster is one especially designed for it by the General Electric Co. The above description applies to the standard car, but attention is called to the fact that special equipment of battery and motor can be supplied to meet special requirements of speed or mileage.

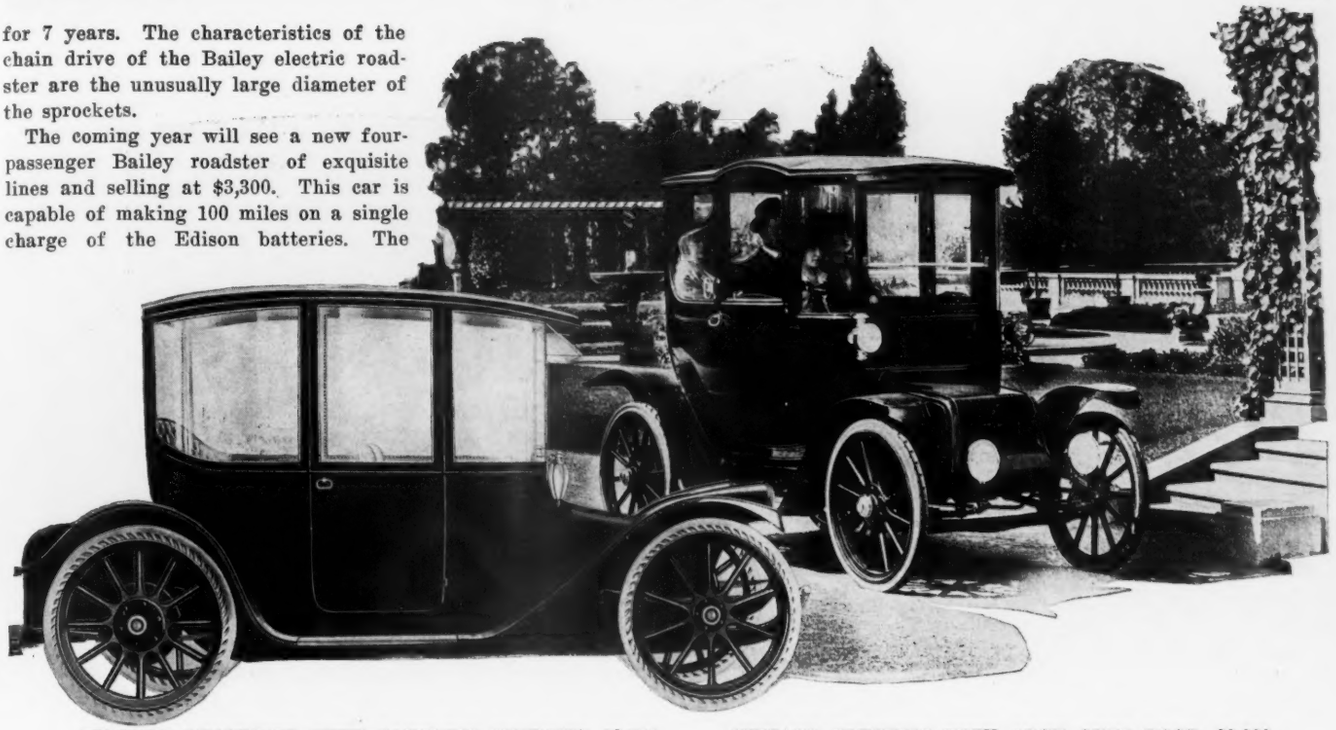


ONE OF BUFFALO'S LATEST MODELS, $3,000

The motor is suspended under the rear hood, driving a jackshaft through a Morse silent chain. From the shaft the power is transmitted to the rear wheels by the double-chain drive, which Bailey has adhered to

for 7 years. The characteristics of the chain drive of the Bailey electric roadster are the unusually large diameter of the sprockets.

The coming year will see a new four-passenger Bailey roadster of exquisite lines and selling at $3,300. This car is capable of making 100 miles on a single charge of the Edison batteries. The



CENTURY LIMOUSINE WITH SASHLESS WINDOWS, $3,250 CHICAGO ELECTRIC WITH ARCH OVER DOOR, $3,000

wheelbase is 132 inches and the tires pneumatic, 34 by 4 inches all around. The motor is of General Electric make and drives the rear wheels through side chains. Six forward speeds are provided.

BORLAND-GRANNIS

A NEW three-chassis series is announced by the Borland-Grannis Co. of Chicago. Aside from body refinements, and changes in material, the new series will appear as last year.

The most important body improvement has been made in the fore-drive coupe, selling at $2,900 in five-passenger form. Three persons are accommodated on the rear seat and two on collapsible front seats. The feature of the construction is that one may enter from either side of the car without interference, this being gained by permitting either seat to be pushed out of the way with a slight touch of the hand. The right forward seat folds up and when revolved takes its place in the corner of the car. The step light feature is retained on the closed cars. In this a light illuminates the running board as soon as the door is opened and is extinguished when the door is closed. Two additions have been made to the equipment list, the new series coming forward with skid chains and a silk umbrella, the value of which novel equipment is evident.

Another coupe body mounted on practically the same chassis, but which accommodates three passengers, is carried over with detail refinements. It appears at the unchanged price of $2,900. The two-passenger roadster, with the sloping hood characteristic of the Borland line for some time, still is offered at $2,550; and the limousine, a five-passenger car, will be seen as before. All cars are of 96 inches wheelbase.

MODEL 36 DOUBLE-DRIVE FIVE-PASSENGER BROC, $3,200

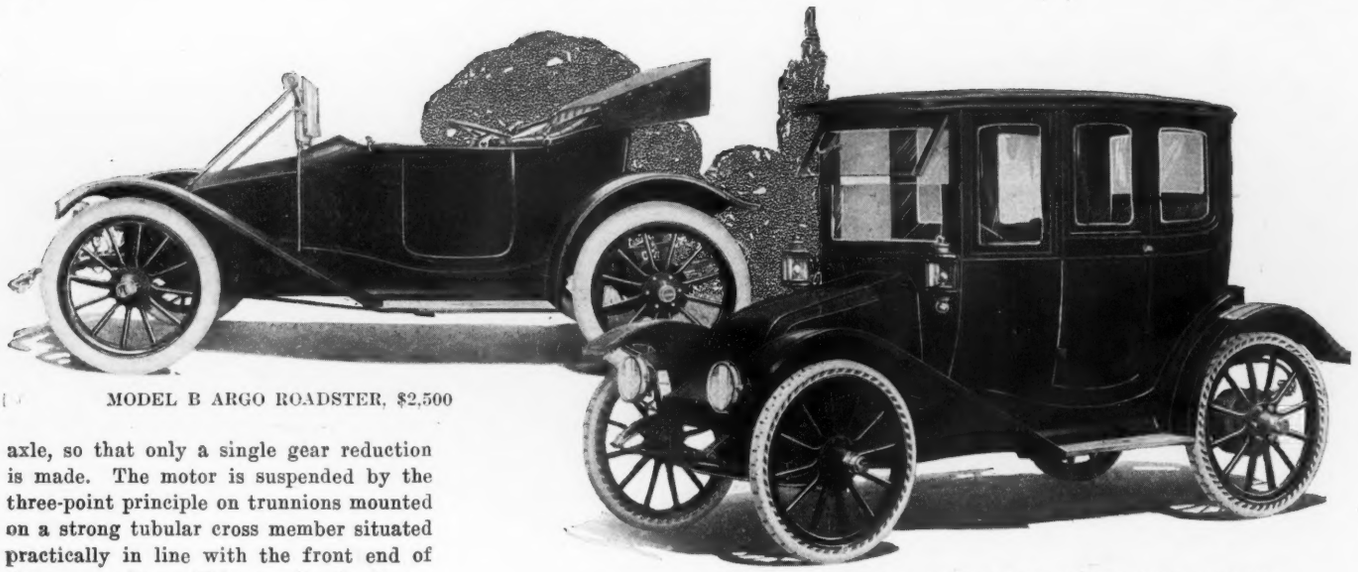
All Borland electrics use Exide batteries of forty cells, except the roadster, which has forty-two cells. The battery supplies current for a series-wound General Electric motor, located amidships and which drives to a floating Weston-Mott rear axle through double universal shaft.

The roadster is the only wheel-steer car of the line, the others using horizontal lever. On a single battery charge the roadster is capable of traveling 75 to 90 miles, according to the average speed attained, and the coupes and limousines vary between 70 and 100 miles. The tire size on all models is 34 by 4 and the type of tire is optional with the purchaser.

BUFFALO

THE line of Buffalo passenger electrics comprises three models; the coupe, seating four, with the two seats facing each other; the two-passenger roadster, and the brougham. In its appearance the brougham follows much on the lines of the coupe, except that the body portion is larger to allow for the difference in the seating arrangement. In this model instead of the passengers sitting facing each other the forward seats are arranged one for the driver, and therefore permanently facing forward, and the other of the swivel type, enabling the passenger either to look ahead or face the occupant of the rear seat.

All three models are mounted on the same chassis, which has not undergone any alteration during the past year. The drive is direct to the differential on the rear



MODEL B ARGO ROADSTER, $2,500

MODEL C ARGO FIVE-PASSENGER BROUGHAM, $3,100

axle, so that only a single gear reduction is made. The motor is suspended by the three-point principle on trunnions mounted on a strong tubular cross member situated practically in line with the front end of the rear springs. This permits the necessary radial action.

A Diehl motor, specially designed for this chassis, is used. It is of the four-pole type, with a totally inclosed cylindrical casing. The armature shaft runs on ball bearings. Through the front end of the magnet casing the armature and field wires lead to the controller.

The controller is of the barrel type operated by a short hand lever situated at the side of the driving seat. In addition, there is included in the electrical control system a pedal-operated switch which is one of the principal features of Buffalo electric design. The pedal in connection with this switch also applies the service brake, and it is this duality of function of an important control member which simplifies considerably the driving of these vehicles.

Both the service and emergency brakes operate on the rear axle, the former being of the external contracting type and the latter internal expanding. The pedals for these brakes are the only control members for the feet, and since one of them also acts in the capacity of controller of the three-point regulating switch, as mentioned above, the car can be driven with both hands free for steering purposes, stopping and starting being accomplished solely with the feet.

The hand lever, which acts as a master essential feature of the control is that in whatever position the hand lever is stationed, application of the service brake pedal cuts out the motor circuit entirely.

Starting and stopping are simple operations, as follows: First, the service brake pedal is depressed, thereby fully applying the brake. Then the control handle is set to a convenient speed, the second notch, representing approximately 15 miles per hour, being advised. The car will then start by simply raising the foot slowly. This action first releases the brake then passes through a neutral point into the first contact of the switch, when the motor current passes through the whole of the special starting resistances. Further releasing of the pedal gradually cuts out the steps of this resistance until the car is running on the full current allowed by the particular notch on the hand lever quadrant.

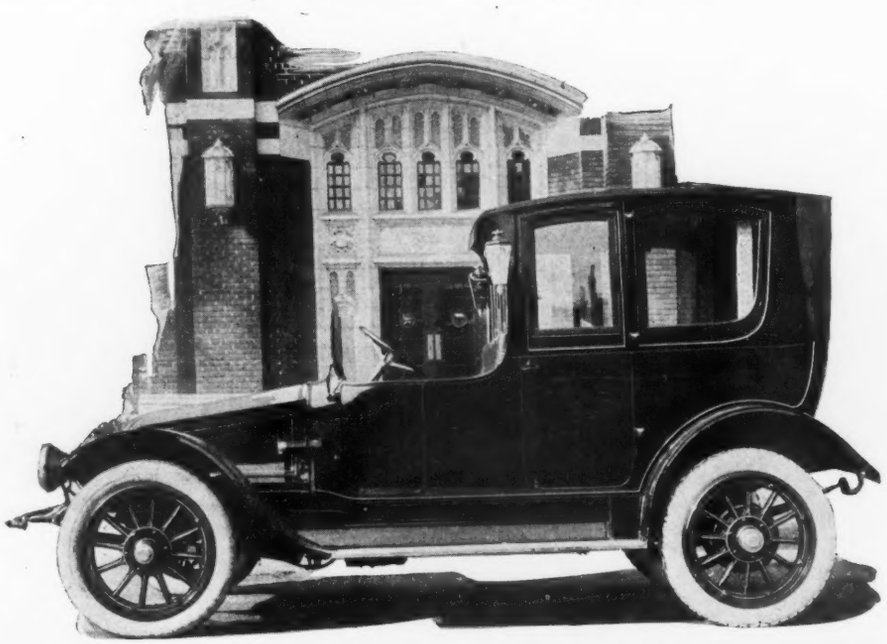
In stopping, the control lever can be entirely forgotten. It is only necessary to apply the brake. Having brought the car to a standstill by this means, the lever is moved back to neutral, cutting off all current. The second pedal, actuating the emergency brake is then depressed and locked by the trigger at the toe, when the service brake can be released, and the car left standing.

The special foot control switch is of the sliding brush type with a magnetic blow-out device fitted on the final contact. This is necessary, as this contact breaks the entire circuit just before the brake comes into operation. The spark that otherwise would occur on breaking the current would have a tendency to burn up the edges of the contact piece and the copper brush. By fitting the magnetic blow-out this sparking is impossible and the switch therefore requires scarcely any attention. In the Buffalo models, wheel or lever steer is optional except in the roadster, for which the wheel is standard. Both models are of the irreversible type.

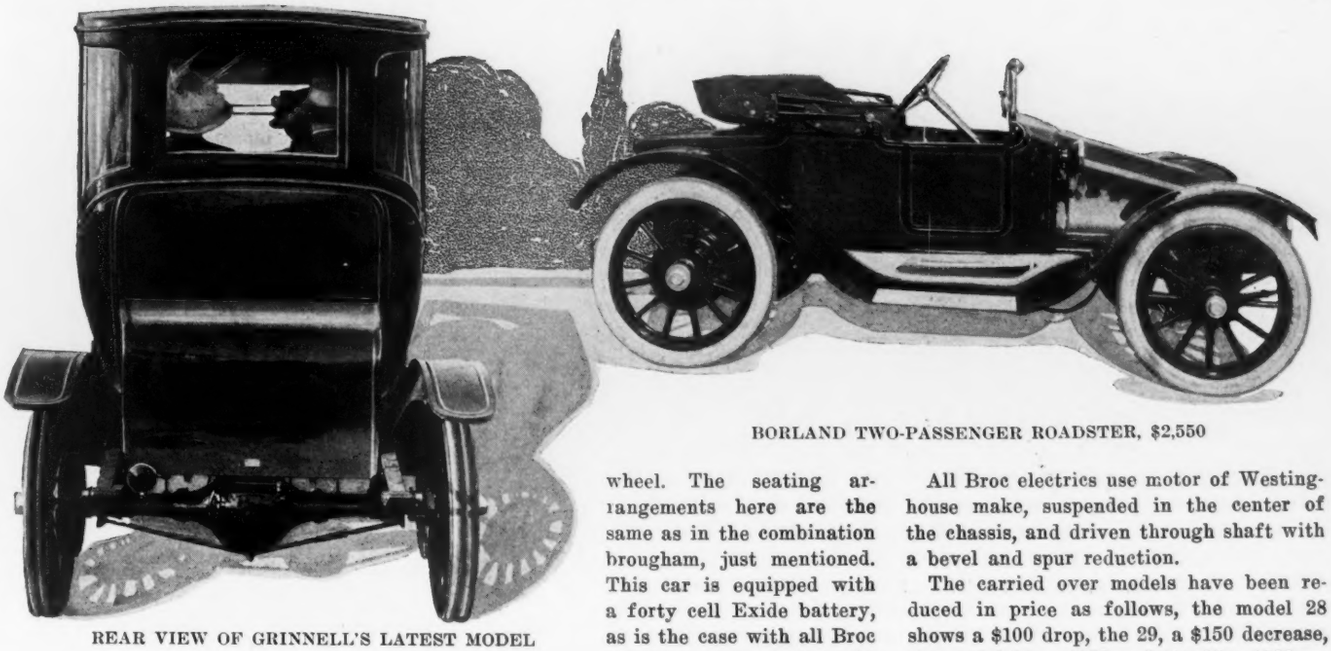
The standard battery equipment is forty-two Philadelphia fifteen-plate cells. This applies to all models. The mileage obtained naturally differs both with the driving and the load carried in the three models, but 75 miles per charge is a fair average on a carefully-driven vehicle. The prices are: Roadster, $2,600; coupe, $2,900; brougham, $3,000.

BROC

OF THE eight chassis in the Broc line for the coming year, four are entirely new, these being models 33, 34, 35 and 36. The carried-over cars are practically the same as the older series and are known as models 28, 29, 31 and 32.



MODEL 60 BORLAND SEVEN-PASSENGER LIMOUSINE, $5,500



BORLAND TWO-PASSENGER ROADSTER, $2,550

REAR VIEW OF GRINNELL'S LATEST MODEL

The feature of Broc electric for the new season is the magnetic breaker. The purpose of this breaker is to prevent damage to the mechanism on account of unskilled driving. This is accomplished by the breaker by holding the controller lever in such a position that the contacts are between speeds. Arcing is prevented by this device.

The model 36 is equipped with a double drive and with it the operator may sit either in front or in the rear. When in front the added mechanism for the rear is inoperative and vice-versa. The car is a 5-passenger brougham listed at $3,200. This lever-steer car seats 3 passengers in the rear and two upon revolving front seats. The control in this vehicle is by lever. The wheelbase is 96 inches, on all models.

In the model 35, a five passenger front-drive brougham listed at $3,150, the control is by foot pedal and the steer by wheel. The seating arrangements here are the same as in the combination brougham, just mentioned. This car is equipped with a forty cell Exide battery, as is the case with all Broc electrics, this being the same battery size that has been used heretofore, the Broc company believing that satisfactory speed and mileage may be obtained by the use of a 40-cell battery and that to increase the mileage per charge only means greater charging cost, greater weight, upkeep and renewal costs.

The model 34 is a five-passenger front-drive, lever-steer brougham with lever control listed at $3,100 and is equipped with two revolving front seats. The 33 is almost the same as the 34 just mentioned, except that it is a rear-drive car.

The carried over models are all broughams accommodating five passengers, two of these, the models 28 and 29, being rear-drive lever-steer and control cars, listed at $2,900 and $2,950 respectively. In these the two front seats are stationary. The models 31 and 32 are front-drive cars selling at $2,950. The 31 has lever steer and the 32 wheel steer.

All Broc electrics use motor of Westinghouse make, suspended in the center of the chassis, and driven through shaft with a bevel and spur reduction.

The carried over models have been reduced in price as follows, the model 28 shows a $100 drop, the 29, a $150 decrease, the model 31, a $150 and the 32 a $100 reduction. The present prices have been quoted previously on this page.

ONE OF GRINNELL'S LATEST MODEL BROUGHAMS, $3,400

CHICAGO

ASIDE from detail refinements in body and chassis Chicago electrics, made by the Chicago Electric Motor Car Co., for the coming year will be as in 1913, the line consisting of two chassis, one of 96-inch wheelbase and upon which are mounted two coupe bodies of different design, and one chassis of 104-inch wheelbase, which is fitted with a limousine body. The coupes are known as the models 141 and 143 and the limousine as the 142.

Model 141, selling for $3,000, has a body of fine design and appointments with the drive on the left side of the rear seat, the steering being of the lever type. The rear seat is 53 inches in width and seats three passengers comfortably. The front seat accommodates two persons who face the other passengers, or by an arrangement of the seats may face sideways. The operator's view in this car is unobstructed in front, behind and at the sides. The length of the interior of the body is 70 inches.

Aside from the beauty of the body lines and construction the chassis is one with many features. The battery is a forty-cell Hycap Exide, twenty cells in front and twenty in the rear, and supplies current for a series-wound Westinghouse motor of the slow-speed type. The motor is located in the center of the chassis and drives directly by shaft through two universals to a floating rear axle, equipped with a bevel gear drive. The controller is a Westinghouse special and is located directly in front of the motor, thus reducing the length of wiring. Five forward speeds are given by this controller. The feature of the entire control system is that a mistake cannot be made by the driver. Reverse cannot be entered

LATEST MODEL OF BAKER BROUGHAM, $3,100

unless the brakes are first applied. The brakes of this chassis consist of internal expanding brakes on the rear wheels and a contracting band on the drive shaft.

The only difference between model 141 and 143 is in the body. The latter has a body in which the two passengers in front may face in any desired direction, this being obtained by the use of revolving front seats. Aside from this feature the bodies and chassis are identical. The price is $3,000

In general construction the chassis of model 142 is the same as that mentioned above, the only difference being in the wheelbase and price, which in this case is $3,300. The body type here however is a limousine, of the forward-drive type, all passengers facing forward. The rear seat accommodates three passengers and two extra seats are provided, one for the driver and one for a passenger. The fifth passenger seat may be folded out of the way when not in use. Entrance is gained from either side of the body without interference. This limousine has a turning radius of but 38 feet. This and all Chicago electrics are equipped with dual tread cushion clincher tires 36 by 4 inches all round.

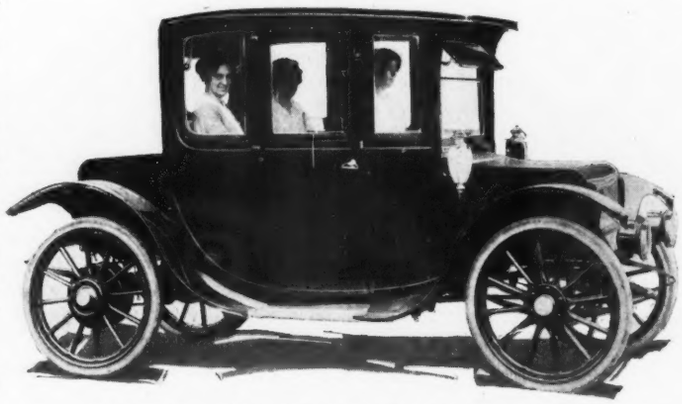
With an ampere-hour capacity of 140, Chicago electrics are able to travel between 75 and 100 miles on one battery charge, it is claimed. The above mileage is based upon a car speed of 20 miles per hour. Factory facilities are better than heretofore, this having been gained by increasing the floor space.

CENTURY

THE Century name is carried by a brand new model for the coming year in addition to the model SB brougham of underslung construction. The new model, known as type LB, is representative of the latest in the electric builder's art and includes among other features the duplex drive, underslung frame at the front end and overhung at the rear, a new type of controller, clear-vision front, and a general stream-line appearance. The price of this new model is set at $3,250, while the other lists at $2,650.

The new Century has a wheelbase of 104 inches, and the length within the new Brougham is 72 inches from glass to glass.

The upholstering for electrics has undergone very little change. Whipcords and Bedford cords predominate, the Century specifying Bedford cords, fancy cloths, broadcloths or hand-buffed leather. A feature of the aluminum running board construction is the inlaying of small cocoa mats below the doors to prevent the tracking of mud into the car.



WAVERLY FRONT-DRIVE FOUR-PASSENGER, $2,900

MODEL 107 WAVERLEY FORE-DOOR BROUGHAM, $3,150

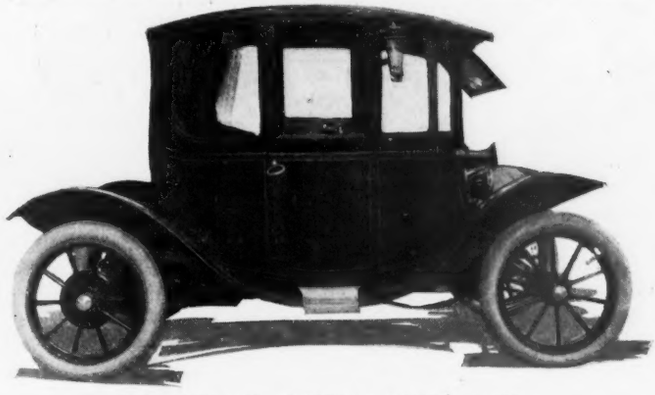
The interior dimensions of the new model LB reflect a tendency toward greater comfort for the passengers in the way of more roomy and wider seats, and greater leg room. The rear seat width is 50 inches; depth 20 inches; cushion 8 inches thick. The width between the doors is 58 inches and between the forward and rear seats 10 inches is provided. The door width is 26 inches. The front seats also are very comfortable, having a depth of 19 inches and width of 18 inches. These dimensions, together with their elaborate upholstering, put them in the Pullman class. Plenty of space for milady's hat is given by the 42-inch distance from the top of the rear seat to the roof.

The controller on the model LB is in duplicate and within easy reach of the rear seat or the forward seat when the

latter is in driving position. The controller is of magnetic type and appears in entirely new form. A short lever somewhat resembling the spark or throttle lever on the steering wheel of the gasoline car takes care of the six speeds forward or reverse. Thus horizontal handles of any type are done away with, the lever playing over a quadrant on top of the controller box.

A feature of the new Century control is the fact that it may be operated either by hand or foot. For foot operation, by a gradual forward movement of the pedal, the car speed is diminished. Continued downward movement applies a cut-out, then a dynamic brake and finally a mechanical brake acting on the rear wheel drums to bring the car to a full stop. By allowing the brake pedal to come back to its normal position, the driving speed is again continued. The other pedal also operates a cut-out and is the emergency brake externally contracting on the brake drums. To reverse the car, a small button in the top of the controller is pulled up until it catches. Then the speed lever operates the same as ever and sends the car backward at the same rates of speed as forward.

MODEL J-4 RAUCH & LANG COACH WITH FORWARD DRIVE. $3,100



THE TIFFANY ELECTRIC COUPE, $2,500

The steering is by horizontal lever, and like the controller, is in duplicate for either forward or rear drive. For the front driving, the front seat which is pivoted is swung around in position and a latch holds it rigidly—a necessity for driving. There are also two sets of pedals for use in either driving position. When driving from the rear, the front seat may be turned around out of the way. The steering lever is made to hinge down against the side of the body.

The new model LB Century carries more battery than the model SB. Forty-two cells of Exide or Willard battery are carried in forward and rear compartments, whereas the model SB has thirty cells. these are of the non-wash jar type. At average running speeds on the level it is probable that the car is good for about 80 miles on a charge.

The motor used is of General Electric make of the slow-speed type. It is a four-pole, series-wound type, and said to be good for 500 per cent overload. This motor is mounted about amidships and on three points. The drive back to the axle is through a direct shaft with no reduction except in the rear axle. The drive is taken through the springs. All wiring is carried in conduits as protection against water or acids.

A special feature of the running gear of the new Century creation is the provision against continual oiling of the various bearing surfaces. All these are completely inclosed and packed with grease. No spring grease cups are fitted, the spring bolts working in special graphited bushings. Thus it is stated that after the car leaves the factory no oiling is required except a few bearings and the differential at intervals of about 6 months.

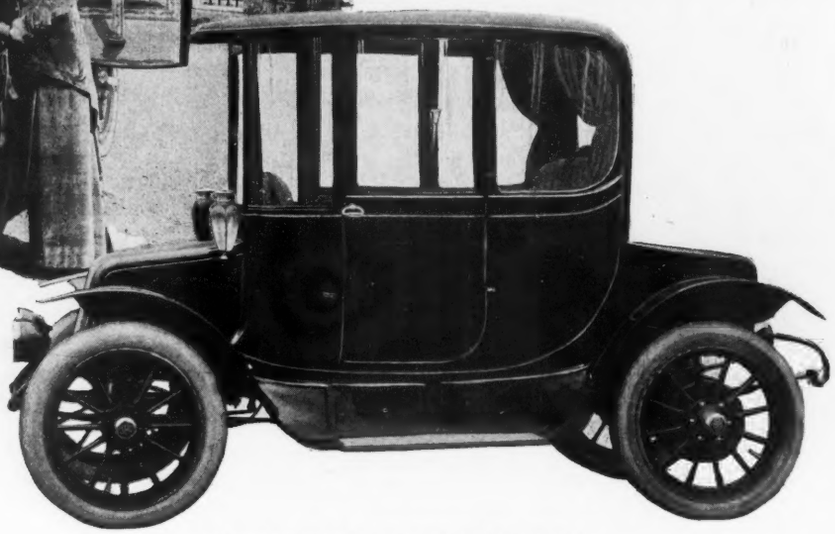
The standard tire equipment of the model LB is Motz tires, size 36 by 4½ inches. The equipment is complete in every respect.

The model SB differs from the brougham of last season only in a few minor refinements. Its general appearance and construction are unaltered. Both front and rear of the frame are underslung, and the spring suspension is of the same type as used on the other model.

MODEL J-4 RAUCH & LANG COACH, WITH DUAL DRIVE, $3,200

AN OHIO FEATURE IS CLEAR-VISION WINDOWS

Tires on this car also are Motz as standard, but they are 36 by 4 inch. The lamp equipment matches that of the larger model, while the other extras, such as speedometer, Klaxet signal horn, toilet case, smoking set, cut glass flower vase and tool outfit, are in evidence on this as on the other car. The equipment as a whole indicates refinement.

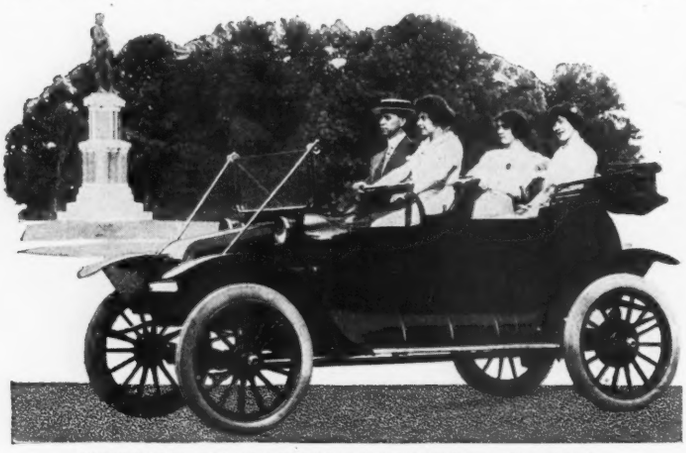


ANOTHER VIEW OF THE OHIO, $3,200

DETROIT

FOR 1914 there are six models of Detroit passenger electrics which cover the entire field of these vehicles from the palatial five-passenger brougham with its duplex drive to the roadster type, the gamut including victorias in addition to the various brougham styles. The Detroit for next year is a highly improved vehicle as compared with the 1913, yet is listed at considerably reduced prices over those prevailing during the present year, the price range extending from $2,300 to $3,000.

It can be stated generally that on all models made by the Anderson Electric Co. the wheelbase is longer, the additional space gained thereby giving more room to the bodies. Tires generally are larger, an example being that a model fitted with 32 by 4-inch tires this year carries 34 by 4½ next year. In addition to larger tires there is an increase in battery capacity all along the line. As heretofore forty cells of lead type are standard in all models but instead of eleven plates per cell the number has been increased to thirteen. This means raising the ampere-hour capacity from 140 to 162. To accomplish this result thinner grids are used, these resulting in a greater mileage per battery charge. Another advantage that may be added is that a higher voltage is maintained with a thin plate cell, which gives more power on hills and aids in acceleration. Batteries for the Detroit cars are assembled at the Anderson plant. For next year the no-wash cell is used, this cell having a 2¾-inch mud space in the bottom of the cell, this space being ample for all the active material carried in the plates and making it unnecessary to have the cells washed before the plates are renewed.



FRITCHLE FIVE-PASSENGER TOURING CAR, $2,500

A most conspicuous feature of Detroit electrics is that three models for next year will be fitted with worm drive, the Lanchester type of worm mounted beneath the axle being used. The models so fitted are the duplex-drive, five-passenger brougham, and the roadster. The Lanchester worm is of the hour-glass type, the teeth being so formed as to partially embrace the circumference of the worm wheel which is fitted to the differential, the teeth of this worm wheel being also concave to adapt themselves to the worm. Three teeth of the worm always are meshing simultaneously and share the driving load. Mounting the worm beneath the worm wheel permits of its constantly running in a bath of oil. On the other three Detroit models, namely, victoria, four-passenger brougham and five-passenger brougham, bevel-driven axles are employed.

Not to be overlooked in Detroit electrics for next year is the duplex drive used on one model officially known as model 48. In this model all passengers face forward, the two front passengers occupying individual armchair type seats. The duplex drive consists in two steering tillers, two controller handles; in short, two complete driving units, one for the front seat passenger, the other for the rear. When the front seat drive is being used the rear seat control parts fold against the wall, and vice versa. This permits the driver to sit in the rear when only one passenger is carried or at the front when there is more than one passenger.

On several Detroit models the Hanlon patented rain-vision front window is regular equipment. This window consists of two glass panels forming the upper half of the glass front. Both are hinged at the top, and one is outside of the other. Both can be pushed forward to any angle, or the inner one can be left vertical. The object of the outer pane is that it forms a protection against wind or rain, while the inner pane may be left vertically. In winter weather both of the upper panes may be brought all the way down, in which case there is an air chamber between them

which prevents either of the panes frosting.

Further improvements in Detroit electrics show a general increase of brake capacity, the brake drums of the rear hubs being increased generally.

Bodies in all cars have been generally improved. Internally they are wider and longer. Whipcord is most popular in interior finish, although there is steady demand for leather. When either is used plain walls and ceiling in contrast with the tufting of previous years are employed. On nearly all models the crown form of rear fender is used. Equipment constitutes an important feature throughout and includes speedometer, clock, Weston voltammeter, and the latest styles in sunburst lights, vases, etc.

SIDE AND FRONT VIEWS OF NEW WOODS ROADSTER $2,500

FRITCHLE

ALTERATIONS in design of Fritchle electric vehicles produced by the Fritchle Automobile and Battery Co. have been more in line of details than in any radical changes in design, except in the adoption of worm drive. The same four body types which comprise the 1913 line are continued this year and prices remain the same. They are $2,500 for the roadster, $2,400 for the runabout, $3,000 for the coupe and $3,600 for the brougham. The runabout is a two-passenger car, while the roadster and coupe are each three-passenger vehicles, and all three are on a wheelbase of 88 inches with 34 by 3½-inch tires, which may be either cushion or solid, as desired. The brougham is a five-passenger car with 86-inch wheelbase.

Batteries comprise 32 cells and the new thirteen-plate type has been adopted, replacing the thicker eleven-plate battery of last year. The new ones are believed to give greater life, have a greater capacity and yet are lighter. The electric motor is unchanged, although there is a slight alteration in the method of support. For next year it is flexibly suspended from the body at a point where the motor and torsion tube are balanced so there is no weight on the rear axle. The chief change occurs in the final drive, Fritchle electrics being supplied with a worm-gear direct drive for the new year.

The transmission of power from motor to the rear axle is through a shaft without universal joint.

There has been a slight change in suspension of the car itself, elliptic springs being employed for 1914 in both front and rear and reach rods used to connect front and rear axle. The motor is of Fritchle construction and the controller gives five forward speeds.

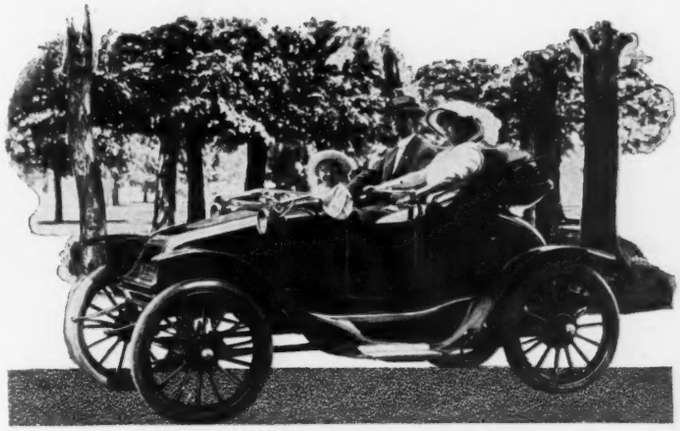
GRINNELL

GRINNELL electrics appear in three different models for 1914, the two styles which compose this year's fleet being continued with but one important change. A new model, called model R, has been added. The two older ones, models M and K, the former a four and the latter a five-passenger brougham retain the same prices. $2,950 for the four-seater and $3,200 for the five-seater. The new model R, also a five-seater, is listed at $3,400. Model R, which is the new production, and is the leader of the Grinnell line, is provided for either front or rear drive interchangeably.

The one other important change in Grinnell electrics is the introduction of horizontal control on all models. In this speed changing is accomplished by a short horizontal lever which is moved forward for the four speeds and the fifth has to be held in position. This fifth speed is known as a shunt and gives 21 miles per hour on model R and 22 miles per hour on model K. Unless held in place, the control lever automatically will come back into fourth speed.

The reason for this is that the fourth speed, 18 miles per hour, is considered high enough for ordinary conditions and 21 or 22 miles capacity is supplied for emergencies, but not for regular use. To see that the operator is using due care when going at this speed, the idea of holding the lever in position has been adopted in this.

Added grease cups to all working parts of the chassis is one of the features. This supplies to both ends of the springs, steering parts, universal joints and so on. A new fan-shaped sheet metal cover plate for the hubs is an innovation of the Grinnell car. This conceals the ends of the hub flange bolts and is held in place by the hub-cap. In addition to improving the



FRITCHLE TORPEDO ROADSTER, $2,400

appearance of the car it makes it easier to wash the hubs.

Window space has been increased generously in the new model R; in fact, there is very little framework to obstruct either the forward or backward view. Anti-rattlers are used for all windows, including both parts of the front or windshield portion. Door windows are made with mahogany sashes which are said to be not affected by weather. These windows at the base have a sash beveled to fit upon a knife-blade support which excludes rain. In the new windshield scheme the shield has a permanent glass shade for rain or snow and in addition the upper half of the front can be inclined outward at any angle desired and the lower half drops out of sight.

Five different speeds may be obtained, the first is 8, the second 12, the third 16, the fourth 18, and the fifth 21 or 22 miles per hour. There is a reverse pedal which, when pressed in conjunction with the movement of the controller lever, gives the same number of reverse speeds. The speeds for this year are no higher than those of last year.

A novel feature of Grinnell control is the automatic cutout accomplished by the service brake pedal. Depression of this pedal cuts out the driving current, no matter for what speed the controller is set. Before any speed will take hold after the brake pedal is pressed, it is necessary to bring the controller handle to neutral and then progress through the range of speeds. Batteries are of the U. S. L. make, and all are the fifteen-plate type. Model K has thirty cells, giving 60 volts, and models M and R, forty cells, giving 80 volts. The mileage on the one battery charge is from 65 to 100 on model K; in fourth speed it is 80 miles, in third speed 85 and second speed 95 on good level roads. The batteries are of the thin-plate type and in the base of each cell beneath the plates is sufficient space for all of the active material carried in them, so that the cells do not need washing in order to be sure that none of the plates is being covered with fallen material which may interfere with chemical action.

Running gear details have been little changed, the McCue axles used in front and rear are the same, although in the larger models they are slightly heavier. The rear axle is of the floating type and springs are elliptic both front and rear.

There is direct drive from the motor to the rear axle in all models through propeller shaft with two universals. On models R and M there is a reduction in the rear axle of 4.5 to 1 and on K, 4 to 1. The drive from shaft to axle is through bevel gears. The motor employed is a low-speed Grinnell motor which rotates at 900 r. p. m. The low speed is believed to make for quietness. The motor is rated at 3.25 horsepower, drawing 28 amperes.

Bodies are of sheet aluminum hammered to the curved form. Model R is one of the few electrics without a left door and as a result the body has a one-sheet panel forming the entire left side of the body.

One of the features of the lighting system is that the dash lights are on separate switches, one controlling the right light and the other the left. In this way only one light need be burning when the car is standing by the curb. In the model R the bank of light buttons is on the window sill on the left side so as to be convenient for either front or rear-seat driving The dome lights turn off when the door is shut and on when the door is open, but there is an additional switch to turn them on if needed when the door is shut. The drive for the speedometer is taken off the motor shaft. This is because it is often impossible to get flexible shafts which wear well with cushion tires when the drive is taken off the front wheel.

OHIO

OHIO electrics, in three models, practically enter the 1914 selling year with no appreciable change. The chassis are known as the models O, M and Y and are practically the same throughout. The three chassis have a wheelbase of 98½ inches and standard tread. Two of the body types, namely, models M and Y, have the double-drive feature which was used by the Ohio company this year. Model O is a single-drive car, its front seats being pivoted so as to turn in any desired direction, same as used in the other two cars.

In the bodies the most noticeable difference is in the use of sashless windows instead of the framed variety fitted to the cars in 1913. The glass plays in felt-lined grooves in the window casings. The bodies as a whole are very beautiful in finish and upholstering and conform to the general trend of design for this class of vehicle. Sheet aluminum is used in the making of the Ohio bodies, the roof being a single sheet. Besides the usual long list of equipment within the luxurious bodies, the new Ohio models are furnished with electric heaters for the winter time. These heaters, one of which is placed in each of the front seat pedestals in the new cars instead of being placed along the front in tube form as heretofore, are of the resistance type.

The chassis embodies an overhung cold-rolled pressed-steel frame of channel section suspended on half-elliptic front and three-quarter elliptic rear springs. The front axle is a drop-center I-beam, while the rear axle is of the floating construction, with the weight carried on the housing. Hess-Bright ball bearings are used throughout the axle and wheels.

A special feature of the Ohio chassis construction is the suspension of the motor by a ball-and-socket joint amidships of the frame. The torque tube inclosing the driveshaft fastens rigidly to the end plate of this motor through a yoke. At the rear end this torque tube bolts to the rear axle housing through a flange. Thus the rear axle, driveshaft and its housing and the motor form one rigid unit. There are no universal joints in the driveshaft in this construction, the motor's ball-and-socket mounting allowing it to align with the rear axle at all times. With this direct shaft construction the reduction between motor and rear wheels is 4 to 1. The motor is a slow-speed, series-wound type of exceptionally large size.

Battery equipment on the new Ohios shows no change over the present cars. The standard battery equipment is forty cells of thirteen-plate Exide. Non-wash jars are used, making it unnecessary to wash them out during the life of the plates. When specified, Edison battery is furnished at an additional cost. The battery is carried in the usual compartments front and rear. Double external contracting brakes act on the rear wheel drums. All models are equipped with an automatic current cut-out on the emergency brake. When the pedal is pushed downward to apply the brake this operation automatically cuts out the current to the motor from the battery. After the brake is released the power is not automatically turned on again, however. The car remains still until the controller is brought back to neutral, after which it operates as usual. This is a safety feature of much note.

The control of the Ohio cars is unique in that a small hard rubber disk replaces a control lever. This disk is mounted on the end of the controller and is turned in either direction from a neutral point to give forward and reverse speeds. Besides the speed-regulating disk, the control head embodies within it integrally a bell button for warning signal, the controller lock button, and magnetic brake button. All of these are so close together on the control head that their operation by the left hand is a simple matter, leaving the right hand free for operating the horizontal steering lever. In the double-drive models this control and steering lever are in duplicate as well as the pedals. The steering lever when not in use swings down against the body and out of the way. The steering post is carried on ball bearings, making its operation possible with the minimum of effort.

RAUCH & LANG

ELECTRIC pleasure cars of the Rauch & Lang Carriage Co., Cleveland, O., are characterized by a change from bevel drive in the rear to worm drive. This feature obtains in the roadster, the club roadster and the demi-brougham models, while the town car will remain bevel-gear driven. The prices of these cars will remain the same as last year with the exception of the brougham. The coach type, model J-4, is offered in five-passenger form. The latter comes with three different controlling arrangements, one driven from the front, another from the rear and the third a selective dual control. The controlling

mechanism on the selective dual control car is interlocking, as are the brakes. With the front-seat control the car is listed at $3,100. This is a lever steering control; if wheel steering is used $50 additional is asked. With rear control, a single lever $3,100 is asked and with the double control $3,200. The brougham, with rear-lever control is offered at $2,950.

Alteration in the battery equipment consists of a change from forty cells of eleven plates to forty-one cells in thirteen thin plates on the B-4, the standard brougham, and forty-two cells of the same type on the J-4.

When driving from the front seat the controller must be in driving position before the proper contact can be made. When the driver is desirous of controlling the car from the rear seat, the front mechanism must be thrown out of commission before the rear mechanism can be put into running position. This eliminates a chance of passengers in the rear seat meddling with the controller when the car is being driven from the front.

There are two sets of brakes so arranged that only one set can be in operation at a time. This, like the inter-locking control, prevents any but the driver interfering with the control of the car.

If one of the passengers in the rear attempted to use the steering lever which is not in use, he would find that he could not make very much headway as the lever is only movable about 1 inch when one person is driving from the front. The idle brake pedal is locked securely and cannot be pressed forward while the other brake is being used. Every form of interference has been contemplated in designing this control.

The motor used in Rauch & Lang electrics is Rauch & Lang construction, watertight, and weighs 170 pounds. It is suspended a little to the rear of the middle portion of the chassis. Instead of being horizontal, its axis dips slightly forward so that a straight-line drive with the worm on top is obtained. A universal is fitted to each end of the drive, as well as a slip joint for complete flexibility. With the worm type of final drive a single reduction from a high-speed motor has been obtained. The effort to produce a low-speed motor so as to decrease the amount of gearing necessary between it and the road

SPECIFICATIONS OF ELECTRIC PLEASURE CARS FOR SEASON OF 1914

Name and Model	Body Style	Price	Seats	Wheel-base	TIRES		BATTERY		Miles per Charge at 20 M. P.H.	Make of Motor	Drive	Forward Speeds	Steer
					Kind	Rear	Make and Number Cells	Amp. Hr. Capacity					
Argo, B	Roadster	$2,500	4	108½	Opt.	36x4*	Exide, 40	138	100	Westinghouse	Bevel**	5	Wheel
Argo, A	Brougham	2,800	4	108½	Opt.	36x4*	Exide, 40	138	100	Westinghouse	Bevel**	5	Wheel
Argo, C	Fore Drive Limousine	3,100	5	110	Opt.	36x4*	Exide, 40	138	80	Westinghouse	Bevel**	5	Wheel
Bailey	Roadster	3,300	4	132	Pneu.	34x4	Edison, 60		75-100	Gen. Electric	Chain	6	Wheel
Bailey	Victoria Phaeton	2,600	3	82	Pneu.	32x3½	Edison, 54	150	60-90	Gen. Electric	Chain	4	Wheel
Bailey, F	Roadster	2,900	2	112	Pneu.	33x4	Edison, 60	187½	75-100	Gen. Electric	Chain	6	Wheel
Baker, WA or WB	Open Type	2,300	2	88	Pneu.	32x4	Exide, 34	153	75-100	Gen. Electric	Bevel	6	Opt.
Baker, VAE	Coupe	2,800	4	88	Opt.	32x4	Exide, 34	153	75-100	Gen. Electric	Bevel	6	Opt.
Baker, ZF	Brougham	3,100	5	92	Opt.	34x4½	Exide, 42	135	75-100	Gen. Electric	Bevel	6	Opt.
Borland, 52	Roadster	2,550	2	96	Opt.	34x4	Exide, 42	112	75-90	Gen. Electric	Bevel	6	Wheel
Borland, 50	Fore Drive Coupe	2,900	5	96	Opt.	34x4	Exide, 40	112	80-100	Gen. Electric	Bevel	6	Lever
Borland, 50	Rear Drive Coupe	2,900	5	96	Opt.	34x4	Exide, 40	112	70	Gen. Electric	Bevel	6	Lever
Broc, 28	Rear Drive Brougham	2,900	5	96	Opt.	34x4*	Exide, 40	135	75-95	Westinghouse	Bevel***	5	Lever
Broc, 29	Rear Drive Brougham	2,950	5	96	Opt.	34x4*	Exide, 40	135	75-95	Westinghouse	Bevel***	5	Lever
Broc, 31	Fore Drive Brougham	2,950	5	96	Opt.	34x4*	Exide, 40	135	75-95	Westinghouse	Bevel***	5	Lever
Broc, 32	Fore Drive Brougham	3,000	5	96	Opt.	34x4*	Exide, 40	135	75-95	Westinghouse	Bevel***	5	Wheel
Broc, 33	Rear Drive Brougham	3,100	5	96	Opt.	34x4*	Exide, 40	135	75-95	Westinghouse	Bevel***	5	Lever
Broc, 34	Fore Drive Brougham	3,100	5	96	Opt.	34x4*	Exide, 40	135	75-95	Westinghouse	Bevel***	5	Lever
Broc, 35	Fore Drive Brougham	3,150	5	96	Opt.	34x4*	Exide, 40	135	75-95	Westinghouse	Bevel***	5	Wheel
Broc, 36	Dual Drive Brougham	3,200	5	96	Opt.	34x4*	Exide, 40	135	75-95	Westinghouse	Bevel***	5	Lever
Buffalo, 29	Roadster	2,600	2	100	Opt.	34x4½*	Phila, 42	140	66	Diehl	Bevel	5	Opt.
Buffalo, 30	Fore Drive Coupe	2,900	5	100	Opt.	34x4½*	Phila., 42	140	60	Diehl	Bevel	5	Opt.
Buffalo, 30B	Fore Drive Coupe	3,000	5	100	Opt.	34x4½*	Phila., 42	140	58	Diehl	Bevel	5	Opt.
Century, SB	Closed	2,850	4	96	Opt.	36x4	Opt., 30	165	75	Westinghouse	Bevel	6	Lever
Century, LB	Dual Drive Closed	3,250	5	104	Opt.	36x4½	Opt., 42	140	90	Gen. Electric	Bevel‡	4	Lever
Chicago, 141 & 143	Rear Drive Coupe	3,000	5	96	Cush.	36x4	Exide, 40	140	75-100	Westinghouse	Bevel	5	Lever
Chicago, 142	Fore Drive Limousine	3,300	5	104	Cush.	36x4	Exide, 40	140	75-100	Westinghouse	Bevel	5	Lever
Detroit, 43	Rear Drive Brougham	2,550	4	94	Opt.	34x4*	Lead, 40		50-85	Own	Bevel	5	Lever
Detroit, 45	Fore Drive Brougham	2,800	5	98	Opt.	34x4*	Lead, 40			Own	Bevel	5	Lever
Detroit, 46	Fore Drive Roadster	2,850	4	100	Opt.	34x4½*	Lead, 40		50-85	Own	Worm	5	Lever
Detroit, 47	Brougham	2,850	4	100	Opt.	34x4½*	Lead, 40		50-85	Own	Worm	5	Lever
Detroit, 48	Dual Drive Brougham	3,000	5	100	Opt.	34x4½*	Lead, 40		50-85	Own	Worm	5	Lever
Fritchle, Torpedo	Roadster	2,400	3	96	Opt.	34x3½	Own, 32		100	Own	Worm	5	Lever
Fritchle, Torpedo	Touring	2,500	5	104	Opt.	34x4	Own, 32		70-100	Own	Worm	5	Lever
Fritchle, Colonial	Coupe		5	96	Opt.	34x4	Own, 32		80-100	Own	Worm	5	Lever
Fritchle, Extension	Coupe	3,000	4	88	Opt.	34x4	Own, 32		80-100	Own	Worm	5	Lever
Fritchle, Colonial	Fore Drive Brougham	3,600	5	104	Opt.	34x4	Own, 32		70-90	Own	Worm	5	Lever
Grinnell, K	Brougham	2,950	4	94	Opt.	34x4	U. S. L., 30	175	65	Westinghouse	Bevel	5	Lever
Grinnell, R	Dual Drive Brougham	3,400	5	105	Opt.	34x4½*	U. S. L., 40	175	80	Own	Bevel	5	Lever
Grinnell, S	Brougham		5	100	Opt.	34x4½	U. S. L., 40	158	75	Own	Bevel	5	Lever
Ohio, O	Semi-Colonial Brougham	2,900	5	98½	Opt.	34x4½*	Exide, 40	165	75-125	Gen. Electric	Bevel	5	Lever
Ohio, M	Straightline Brougham	3,200	5	98½	Opt.	34x4½*	Exide, 40	165	75-125	Gen. Electric	Bevel	5	Lever
Ohio, Y	Brougham	3,500	5	98½	Opt.	34x4½*	Exide, 40	165	75-125	Gen. Electric	Bevel	5	Lever
Rauch & Lang, R	Rear Drive Roadster	2,600	3	92	Opt.	32x4*	Opt., 42	153	50-100	Hertner	Worm	6	Lever
Rauch & Lang, CR	Club Roadster	2,800	3	92	Opt.	32x4*	Opt., 42	153	50-100	Hertner	Worm	6	Lever
Rauch & Lang, DB	Demi Brougham	2,800	4	86	Opt.	32x4*	Exide, 42		50-100	Hertner	Worm	6	Lever
Rauch & Lang, B4	Rear Drive Brougham	2,950	4	92	Opt.	33x4½*	Opt., 41	153	60-100	Hertner	Worm	6	Lever
Rauch & Lang, J4	Dual Drive Coach	3,200	5	96	Opt.	33x4½*	Exide, 42	153	60-100	Hertner	Worm	6	Lever
Rauch & Lang, TC	Town Car	3,800	7	105	Opt.	33x4½*	Exide, 41	153	50-80	Hertner	Chain	6	Wheel
Standard, M	Coupe	1,990	4	96	Pneu.	33x4	Exide, 30	140	60-80	Westinghouse	Bevel	6	Lever
Tiffany, M-2	Rear Drive Coupe	2,500	4	100	Pneu.	33x4	Williard, 30	135	75	Wagner	Worm	6	Lever
Waverley, 105	Rear Drive Brougham	2,800	4	106	Opt.	34x4	Opt., 42	162	75	Own	Bevel†	4	Lever
Waverley, 104	Fore Drive Brougham	2,900	4	106	Opt.	34x4	Opt., 42	162	75	Own	Bevel†	4	Lever
Waverley, 107	Four Chair Brougham	3,150	4	106	Opt.	34x4	Opt., 42	162	75	Own	Bevel†	4	Lever
Waverley, 106	Dual Drive Brougham		4	106	Opt	34x4	Opt., 42	162	75	Own	Bevel†	4	Lever
Waverley, 108	Fore Drive Limousine	3,500	5	109	Opt.	34x4	Opt., 42	162	75	Own	Bevel†	4	Lever

Woods—The 1914 models of this make have not been announced up to the time of going to press

†Double herringbone reduction ‡With worm *Pneumatic given **With herringbone ***With spur Opt., optional

wheels has resulted only in the use of a heavier motor. The high-speed motor with worm drive, therefore, gives a light motor with single reduction. The worm is five-thread with a reduction ratio of 8.6 to 1. The worm shaft is carried on large annular ball bearings and end thrust is provided for by a double thrust bearing at one end of the shaft. This arrangement for the thrust at one end instead of both makes for ease of adjustment.

The control system affords two starting speeds and four running speeds forward as well as four reverse speeds. A system of rods and cranks connects the two control levers to the controller proper. The latter is located on the rear seats and the various speeds are obtained by cutting out and inserting resistances and also by the use of a so called bucking coil in the field of the motor.

On first speed the motor fields are in series and resistance is inserted in the circuit. Second speed uses the same field connections but some of the resistance is cut out. Third speed cuts out all the resistance and uses a series field connection. On fourth speed the resistance is cut out still but the fields of the motor are connected in parallel. Fifth speed finds the fields in parallel and shunted and no resistance in the line. On high or sixth speed a bucking coil is used with the fields shunted and connected in parallel. All Rauch & Lang electrics use six speeds and the above method of controlling these speeds. It is claimed that this type affords the proper gradual rise from low to high without excessive drain on the batteries.

All ordinary fast running can be done on fifth speed, but if the sixth is used on the level a speed of over 20 miles per hour can be obtained. An electric brake forms part of the control. This braking action is accomplished by running the motor as a generator on the downward grade and consuming the power generated in a special resistance. This brake alone is said to be capable of holding the car on an 8 or 10 per cent grade.

A lock that can be closed only when the handle is in a neutral position is fitted to the control arm. Although this prevents any action of the electrical part of the control system the brake is unaffected and can be applied whether the lock is closed or open. Expanding shoe brakes are employed on the rear wheels and another brake is fitted to the front end of the motor.

The total weight of the double-drive coach is about 3,500 pounds; approximately 75 miles can be run per charge. The coach has a wheelbase of 96 inches, while that of the other models is 92½ and 93 inches.

Upholstery has been looked to in the matter of comfort. The front seats are provided with well-cushioned backs and are mounted on tubular pedestals upon which they turn. All wiring and levers from the control arm on the left chair are carried down to the chassis inside of the pedestal, leaving a clear external finish. The interlocking mechanism in the double-control machine is also contained in the upper portion of the seat pillar.

STANDARD

THERE has been but very slight change in vehicles of the Standard Electric Car Co., Jackson, Mich. The single coupe model M is continued for the new season. This is a four-passenger car on which the price has been increased $115, so that now it sells at $1,990. Slight mechanical and body changes have been made which, however, do not affect in any way the general design of the vehicle. The alterations in the mechanical features embody an enlargement in the front hubs and bearings, and the rear axle has been rendered more accessible by a slight change in the tube inclosing the propeller shaft.

Alterations in the body details are of minor significance and show a general refinement. All the windows in the car have been changed from sash windows to sashless windows. Standard trimmings are now optional, gray whipcord or blue broadcloth, where previously there was no option. Blue broadcloth formerly was the standard with an extra charge for the whipcord.

In general design the Standard electric comprises a Westinghouse motor mounted amidships with a shaft drive through bevel gears to a floating ball-bearing rear axle. At the rear axle there is a compound gear reduction which permits the motor to be of the high-speed type. The drive from the motor to the axle is through a shaft without universal joints. The batteries are thirty-cell eleven-plate Exide, carried under front and rear decks. The control is by drum-type controller which offers six speeds forward and three reverse, giving a range of from 5 to 20 miles per hour.

Steering is by a side lever which is provided with swivel steering brackets to prevent binding of the steering column. Brakes are internal expanding, acting on the rear wheels. Both are completely inclosed and operated by foot pedals. The brakes are double-locking to provide greater safety on grades. The wheelbase of the car is 96 inches, tires are 32 by 3½ inches in front and 32 by 4 inches in the rear, when pneumatics are employed, and an option of a special cushion tire is offered at an added charge, in which case 34 by 3½ inches is the tire size.

TIFFANY

THE Tiffany Electric Co., of Detroit, will continue to manufacture the distinctively designed car which was formerly known as the Flanders electric in exactly the same form and with a change in name only. The Tiffany is offered in one model only—model M-2—and with a wheelbase of 100 inches and a tread of 56 inches provides seating for four. The body is of the coupe design and the rear-seat passengers

Milady motorist, whose charms are reflected in the mirrors and highly-polished body of the electric brougham, need not demand as utilitarian a coat as her sister who either takes the wheel or rides in the tonneau of the gasoline-driven car. As she is protected from mud, dust, grease and Autumn winds and is seldom if ever called upon to play the role of mechanic, she can yield to the temptation of selecting the most beautiful coat without suffering the anticipations of spots, travel stains and an occasional chilly ride because of that vain choice. Her coat can be worn for walking as well as for riding. In that, she is fortunate.

In the illustration on this page is shown a very smart coat, of mahogany colored corduroy with standup collar of Russion mouse, for the devotee of the electric car. This coat

has a full yoke which, falling from the collar, extends in two broad bands at the front to the bottom of the garment. The sleeves are full kimono with broad kimono cuff. The lining is of rose colored silk. The coat, a model of Mandel Bros., Chicago, sells for $65.

A town coat of tan kitten's ear cloth with roll collar, deep cuffs and trimming of brown velvet, is shown in the above illustration. This coat has set-in sleeves and a drop shoulder, giving a kimono effect, and is slightly cutaway at the front. The large button-holes are inlaid with brown velvet. The lining is of terra cotta colored silk. The coat is listed at $50 *and is shown by Mandel Bros., Chicago. The hat is a lemon colored felt crusher with stitched brim and band and bow of patent leather, selling at* $5.

face forward while those forward face the rear. No swivel seats are provided.

The chassis design is peculiar in that the series-wound motor is directly attached to the rear axle. The drive is direct and does away with universal joints. The Tiffany uses a worm gear, the Tiffany company owning the patents of the Wallwork Worm Gear Co. The worm is mounted below the worm wheel and is bathed in castor oil at all times. Two Hess-Bright annular ball bearings carry the motor and at the same time take the thrust of the worm.

The motor is set at an angle of 41 degrees so that when running the weight of the motor floats on the worm, relieving the end bearing of practically all thrust. The motor is a high-speed type, and the reduction is 9.8 to 1 between it and the wheels.

The frame is overslung and mounted on overhung quarter-elliptic springs. The front axle is tubular, while the three-quarter floating rear axle is of the cast aluminum type. Both service and emergency brakes are internal expanding, manually operated. The Tiffany takes 33 by 4 electric pneumatic tires, Motz being furnished optionally at $100 extra.

The drive is from the rear seat, a steering lever and drum controller being provided. The latter furnishes six forward and reverse speeds. The battery, which is of Willard make, has an ampere-hour capacity of 135 and gives approximately 75 miles on a charge. There are thirty cells, eleven plates to the cell. The Tiffany electric sells for $2,500.

WAVERLEY

WAVERLEY electrics appear in four models, three of which are broughams, and the fourth a limousine. The broughams seat four and the limousine five passengers. Models 104, 105, 106 and 107 are the broughams and are alike except as to seating arrangements, while 108 is the limousine. The brougham is the leader of the Waverley line for this year. This car is built with three different seating arrangements, one calling for front drive with full view ahead and one for rear drive with revolving corner seats in front and the other for dual drive, permitting the car to be driven either from the front or rear seats.

With these different forms for seating arrangement the model number changes. Model 104 is the front drive, model 105 is the rear drive, and model 106 is the dual drive brougham. Model 107 gives another seating arrangement for four passengers in a closed electric. This car is known as the four-chair brougham, each passenger being supplied with an individual seat. The middle one of the rear three is set slightly behind the other two, while the fourth passenger is accommodated in a cozy corner seat at the right. No one is seated in front of the driver, who occupies the left rear seat. This seating arrangement is similar to that of the Waverly limousine four last year.

Model 108 is the five-passenger limousine with full view ahead. This car accommodates three passengers on the rear seat and has two individual seats in front. It differs from the five-passenger limousine of last year in having the left door moved forward opposite the driver's seat so that the driver enters by separate door from that used by the passengers.

There have been some slight mechanical changes in the car. The decks are about 3 inches lower and shorter than in model 98 of last year, but the general lines of the body are retained.

The four-passenger, model 105, brougham, is listed at $2,800, the model 104 with the same style of body, at $2,900 with front steer, the four-passenger, 107, brougham at $3,150 and the limousine a five-passenger car at $3,500.

Wheelbases remain at 106 inches for the brougham and 109 inches for the limousine. Tires are 34 by 4 inches in size and either pneumatic or solid tires may be employed. About 75 miles per charge is the range of the battery at a speed of 25 miles per hour, when the ordinary type of lead battery is employed. Four forward speeds are provided and the steering control on all models is by lever.

WOODS

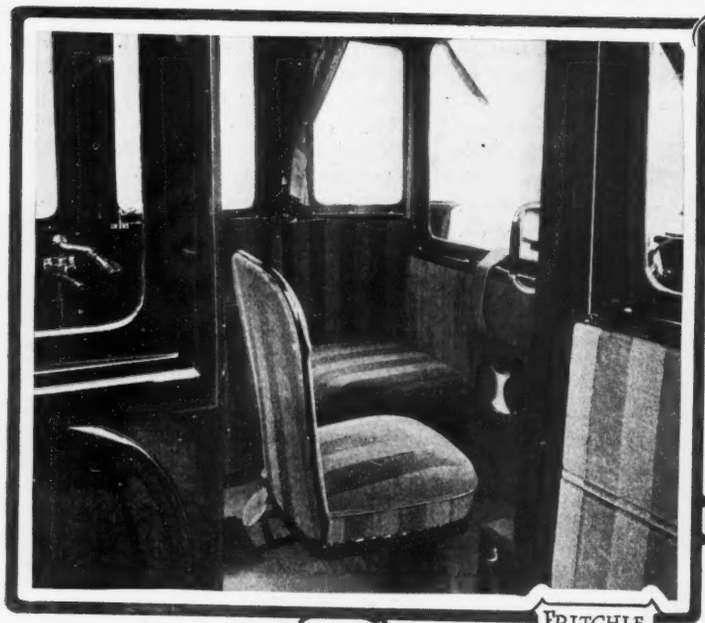
THE Woods Motor Vehicle Co., Chicago, has not yet announced its full line for the coming year, the only new model which up to this time has made its way to the market being a roadster. This car was first introduced a few weeks ago. It is a three-passenger car with a 92-inch wheelbase and is listed at $2,500 with complete equipment. The battery is carried in two sections, one in front and one in the rear of the chassis. The steer is by lever on the left side. Firestone special dual tread tires are used, the sizes being 34 by 3½ inches in front and 38 by 4½ inches in the rear. The rest of the Woods line for 1914 will be announced shortly.

WARD

WARD Motor Vehicle Co. enters the pleasure vehicle field this week, having confined its product to comercial electrics heretofore. Details of the passenger bodies have not been divulged at this time, but the latter will be fitted to a new double-purpose chassis which also carries business bodies. The low drop frame of the chassis is a feature, as are the novel rear springs reminiscent of the old coaching days. The floor of the car is but 24 inches from the ground with the runningboard 1 foot below.

A Westinghouse motor mounted on ball bearings and hung on the frame at the rear drives direct through a shaft and bevel to the rear axle. The battery is carried at the front. Tires are 32 by 2½ inches and the wheelbase 96 inch .

Interior Views



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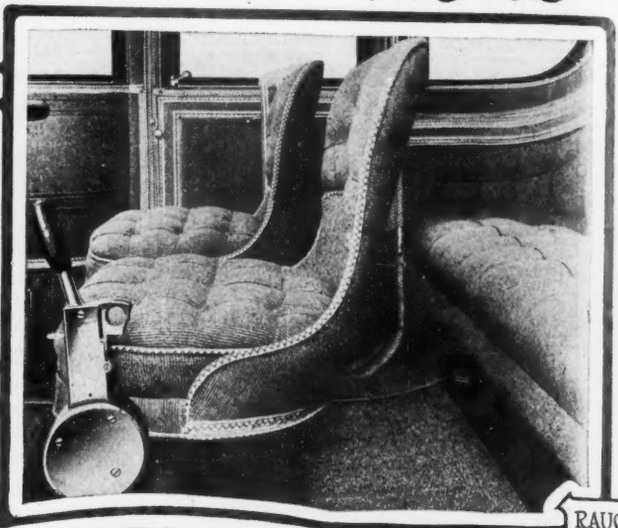

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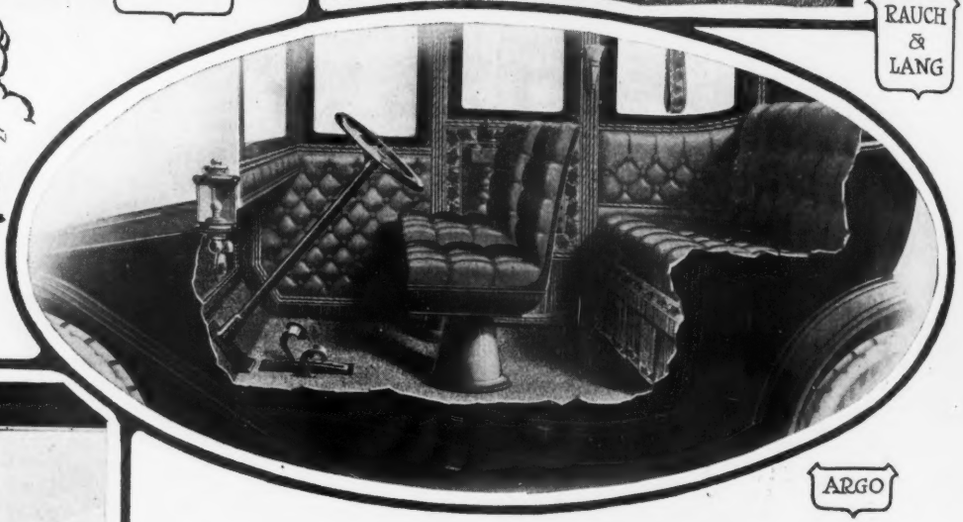

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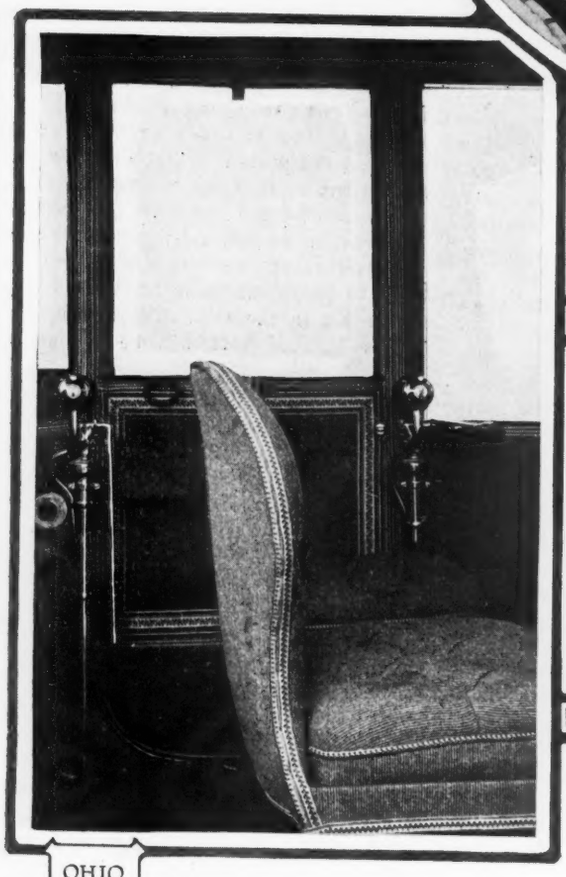

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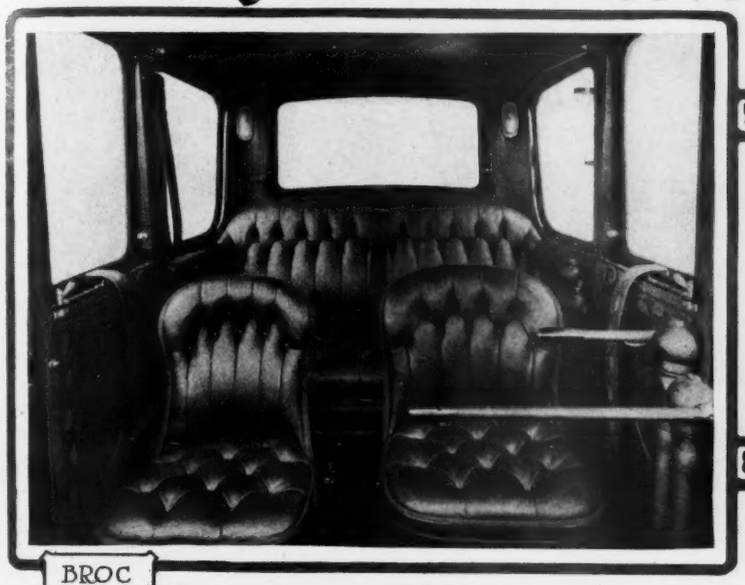
# of New Models



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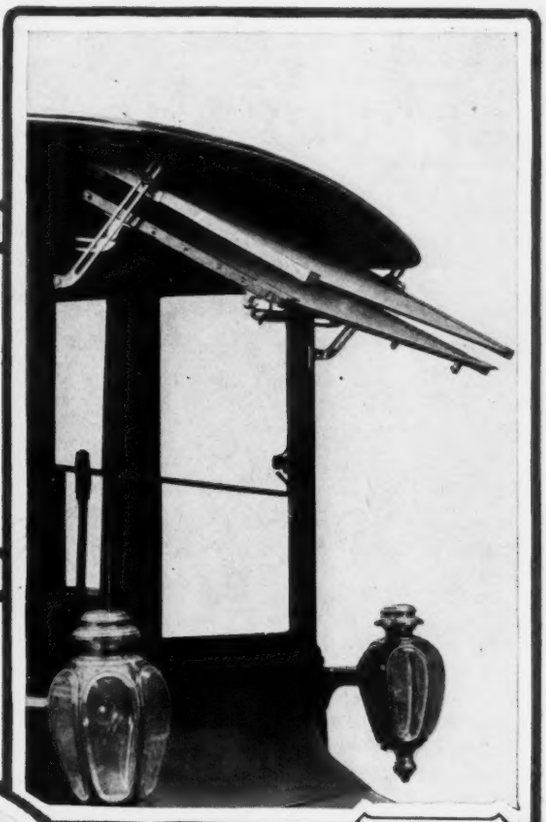
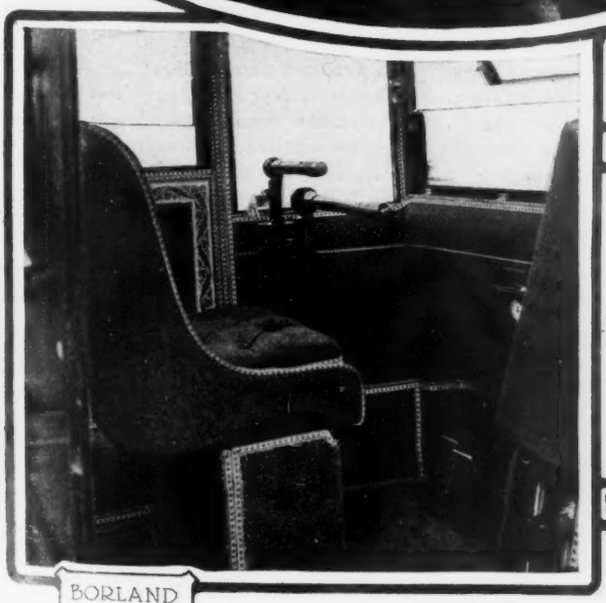
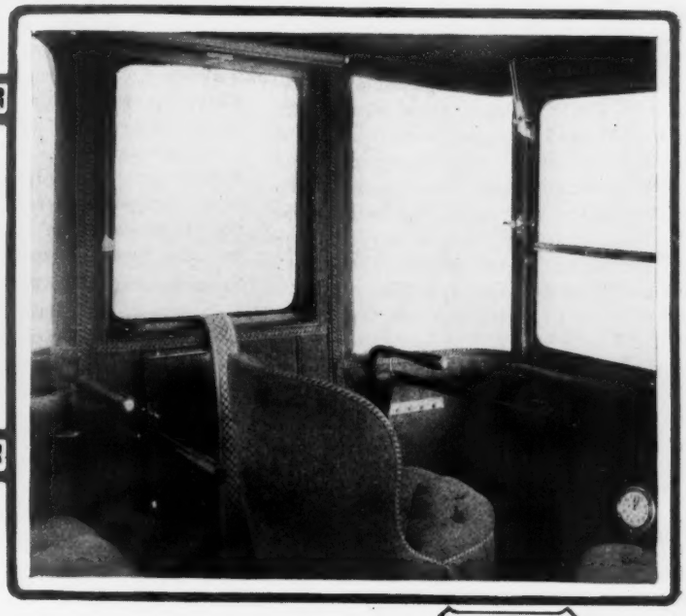


DETROIT

CENTURY

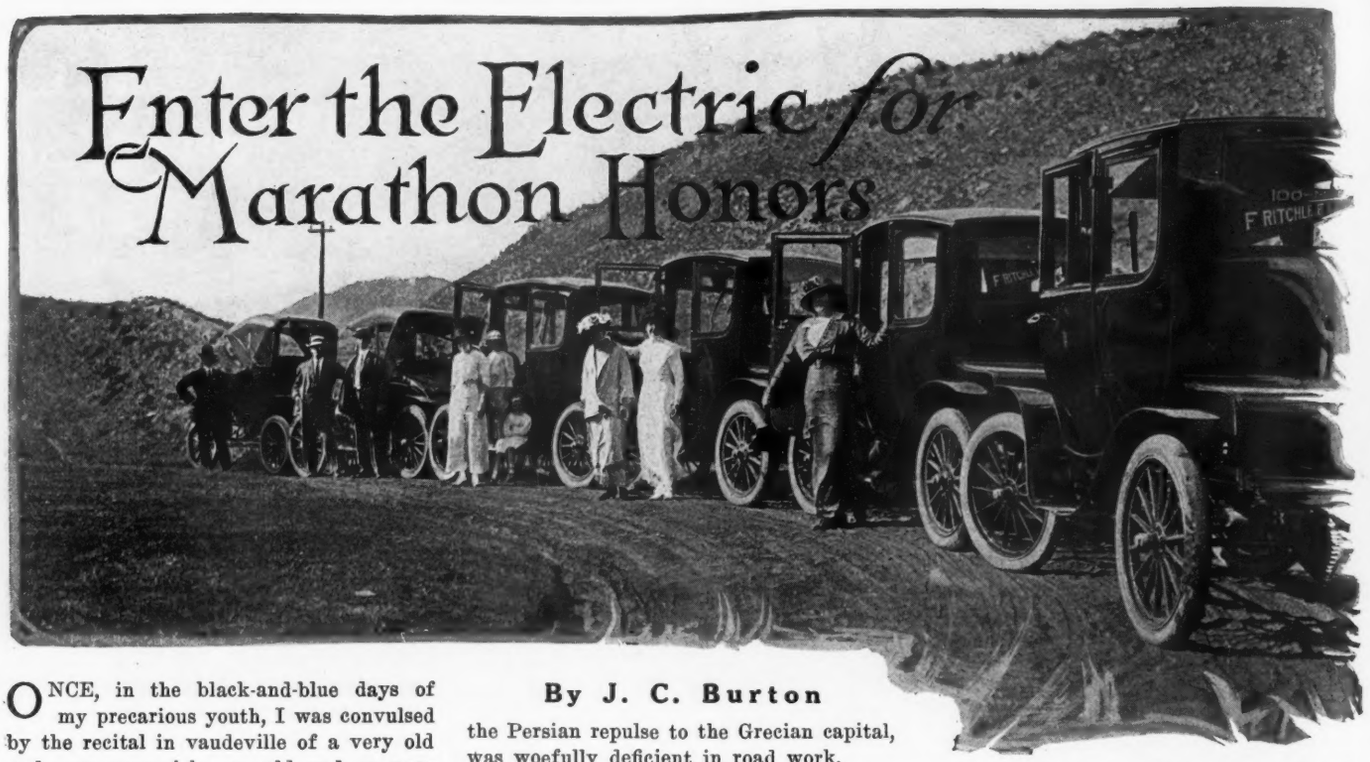


BORLAND



DETROIT

Enter the Electric for Marathon Honors



By J. C. Burton

ONCE, in the black-and-blue days of my precarious youth, I was convulsed by the recital in vaudeville of a very old and very poor joke, so old and so poor that I never will forget it. It went something like this:

"I've got a colt in my stable that will go a mile in 1:57 flat," a boastful turfman asserted.

"Yes, in a box car," was the laconic reply of a skeptical tout.

Now I have no sympathy with the plagiarist, but I fear that I have been guilty of his crime on several occasions when proud owners of electric cars have bragged of the wonderful endurance of their machines. "Yes, in a box car," I have thought after listening to tales of long-distance trips by motorists who do not depend upon gasoline for motive power.

How Are the Heretics Humbled!

Nor was I alone in such supreme skepticism. There are other heretics who regard the electric either as a woman's whim or a boulevard pest and view it with the same indifference that the track team coach does the campus heavyweight who neither has the speed of the sprinter nor the staying powers of the long-distance runner. Like me, it is up to them to humble themselves and apologize.

For in my tireless search for the truant, Truth, I found myself in error. Only recently I discovered that the electric, once dispised as hopelessly feminine, is eligible for marathon honors. In fact, it is a Johnny Hayes of motordom. When well fed and properly encouraged, an electric will reel off 100 miles on a country highway without getting a cramp in its highly polished side or losing its aristocratic wind. It has the famous record of Pheidipprides beaten by about 27 parasangs. Compared with the tireless electric, the sturdy Athenian, who wore out three pairs of sandals in bearing the news of the Persian repulse to the Grecian capital, was woefully deficient in road work.

When in the pink of condition, an electric will jog a century without demanding food or rest. Fifty miles is nothing for a 2-year-old. There is an Argo, which has seen 16 months of service on the boulevards of Rockford, Ill., that covered 104.7 miles on the country roads of the Rock river region on a single charge recently. There is another Argo, owned and driven by Mrs. M. W. Hoyt of Chicago, that has averaged 71.5 miles for 40 days' continuous running, a record that many a gasoline car of the windy city has yet to equal.

Furthermore, an electric is a vehicle without temperament. It is not finicky concerning the roads selected for travel. In August, a Borland was driven from Chicago to Cedar Lake, Ind., and return, a distance of 97.2 miles, on a single charge. This trip was not a boulevard tour, although the roads of Indiana are famed for their excellence, as many stretches of rutted clay and sand highway and several hills were encountered in the interim of travel between the metropolitan asphalt and the Hoosier macadam.

From Larchmont to Broadway

A resident of Larchmont, N. Y., who owns a Detroit electric, this summer drove his car 87 miles over rolling country roads, such as are found in the Empire state along the seaboard, and found that he could have traveled 10 or 15 miles further without having the batteries recharged. He also drives from Larchmont to New York and back, 23 miles each way, three or four times weekly and his average daily mileage is between 35 and 45 miles.

Over hilly roads of stretches of sand, another owner of a Detroit has driven 62 miles from Passaic, N. J., to New Foundland, N. J.

Colonel George A. Zinn, of the United States engineer's office at Philadelphia, reports a single-charge trip of 60 miles from the Pennsylvania metropolis at Atlantic City as a testimonial of the endurance of his wife's Waverley which has average 20 miles daily for the past 2 years.

Traveling 70 miles in one day without stopping at a service station, Mr. Woodman, an electric devotee of the Pacific coast, has ridden from Riverside to Los Angeles in his Detroit.

Robert H. Ennis of Evanston, Ill., recalls a 93-mile tour of the Chicago boulevards and parks in a single day on a single charge as proof positive of the stamina of a Detroit.

Ben Franklin Should Gloat

Imagine, if you can, the chest measurement of the venerable Benjamin Franklin could he read the following: A. F. Tuttle, of Appleton, Wis., recently made a 500-mile trip with a Detroit electric brougham which previously had run 10,000 miles. The route was from Appleton to Elgin, Ill., and return and the party so arranged it that the journey was made in easy stages with a view of getting proper re-charging of the batteries. On the outgoing trip, these re-charges were made at Fond du Lac, Wis., Milwaukee, Lake Forest and Elgin. In the return leg, the batteries were charged at Evanston, Waukegan, Ill., Milwaukee, Sheboygan, Wis., and Fond du Lac.

Against such a fusillade of statistics, the skeptic must retreat from behind his verbal entrenchment, "An electric may be a thing of beauty but not a car for duty," and surrender.

Two record-breaking tours, both promoted by electric car manufacturers, only serve to make the testimony in support of

the electric's endurance redundant. The feats of the Hupp-Yeats that went from Detroit to Los Angeles via El Paso in 1911, and the Flanders, which served as pathfinder for the abandoned Detroit-New Orleans national reliability run of 1912, are old stuff, in the vernacular of the street; yet it cannot be denied that such sustained migrations showed the doubtful Missourians—and they all don't live within the state bounded by Iowa, Kansas, Arkansas and the Mississippi river—that the electric can go where the gasoline car can go, although the going may not be as enjoyable.

To sum up the possibilities of the electric for long distance touring in seven words of one syllable, we find ourselves face to face with the following ungrammatical sentence, "It can be done, but it ain't." A trip of 1,000 miles in an electric isn't a miracle but then again, it isn't a joy-ride. When the number of service stations are increased and the country roads improved, the electric car probably will be a popular vehicle for touring but in the meantime, the electric will be used in work for which it is much better adapted, intercity travel and country club migrations.

Joys of the Suburbanite

For the residents of the suburbs of large cities, the electric is a great little liberator. It has freed them from the bondage of railroad systems, stuffy cars and time tables and raised them from despised commuters to envied motorists. In the role of Garibaldi, the electric has proved itself to be more than efficient. By many, it is regarded the superior of the gasoline car.

"It meets our requirements far better than a seven-passenger gasoline car which we also have in use," is the testimony of an Ohio owner. "For two winters we have been able to lay up the gas car and maintain the electric at a great saving and greater amount of pleasure, not having to feel that the chauffeur is waiting out in the cold and fearing that the motor will freeze."

"The present design and advancement in the construction of the electric should satisfy most any ordinary motor car user's requirements," is the testimonial of another suburbanite. "It is my opinion that if owners of gasoline cars realized that they could use an electric for their needs 300 days in the year—presuming they could afford the time for touring the other 65 days—for one-fourth the price, they would most assuredly adopt the electric."

The electric is a godsend to the business man who makes his money in a large city and his drives and putts at the golf club in the environs of the metropolis. It affords him quick, reliable transit to Colonel Bogey's lair. There is no chauffeur to wait until a deal is closed and no chauffeur to wait for when the desk is closed. And when drives are sliced and bunkers fiendish, the ride is a balm for lost temper.

"45 Minutes from Broadway" Electrics

Linking the Suburbs to the City

By George F. Parker

IS the electric the car for the suburbs? That question was open to wide discussion not so many years ago. Theoretically, the car was. Did it not relieve milady of such annoyances as the whim of the chauffeur? Could she not drive to the bridge club free from the uncertainty of the village hackman's nag? Certainly! She even could drive to the city on her shopping trips and it would be most convenient to go to the station to meet her family at home coming.

Suburbanites Slow to Pick Up

Such were the arguments offered to induce suburbanites to make use of the electric car. It is lamentable that the arguments were of little avail. The horse was still supreme for driving about the country, and the village stage still picked up its quota of passengers at every train.

Is the electric the car for the suburbs?

Within about 30 miles of New York, in the section of Westchester county that is theatrically known as "but 45 minutes from Broadway," are a score or more of electric vehicle owners who will answer that the car meets every one of the varied needs of suburban residents. Further than this, they will tell just how they use their cars.

There is a man in New Rochelle, rather well-to-do for he possesses two machines, one gasoline-driven and other electric. He also has a fondness for music which he indulges during the opera season. The electric is primarily his wife's car. She uses it for all her needs about the village, and in the evening she drives to the station to meet her husband's train. On opera nights, though, she drives to the city, meets him at his office, and they go to dinner, then to the opera house, followed by supper, with a drive of 20 or more miles home at midnight. In addition to this, she makes two or three trips a week to the city for shopping or to attend the matinee.

This owner's experience seems to demonstrate every one of the theoretical arguments for electric car selling that met with such scant return a few years ago.

There is another man of moderate income who felt the need of some conveyance about the village, but found the cost of keeping horses or a gasoline car far beyond his means, for he has three children to educate. An electric car is solving his problem, and although its initial cost was higher than would have been the case with either horses or a gasoline car, the maintenance which is a little more than two dollars a week has more than justified the original outlay. And whereas in 5 or 10 years from now he would have used two or three horse outfits, or probably as many gasoline cars, he feels certain that his electric will be just as serviceable as it now is.

"Oh, but the hills are too hard on electrics," you say. "And after traveling a few miles over the rolling territory of Westchester county the car won't have enough 'juice' in its batteries for any further service."

Theoretically that doubt is well founded—but what are the facts?

A western manufacturing company employs among its New York salesmen a man who lives in Larchmont, just above New Rochelle. This man makes daily trips between his home and his office, a matter of 23 miles each way over rolling country and in addition uses his electric for calling on his trade.

These are typical uses of the electric car in the Westchester suburbs. The same holds true in New Jersey and on Long Island. Nor are they isolated instances as may be seen from the fact that the nearby country is dotted with garages that make a specialty of the electric vehicle business.

Number of Garages Increase

In fact, this chain of electric vehicle garages and charging stations has taken the electric vehicle from its limitation to town use and placed it in the touring car class, especially for those who live in New York or Philadelphia and the nearby towns. Significant too is the fact that these garages have in the main been opened within the past 2 years, forty being the record for 1912. This alone is convincing proof that the electric is suited to meet the conditions of a suburban territory. This chain of garages and charging stations reaches as far north as Pittsfield, Mass., as far east as New Haven, and as far south as Atlantic City, and west to Easton, Pa. They cover seventy towns, whereas in 1911 there was barely thirty towns so equipped, and none of them more than 50 miles from New York.

Another fact that may be taken as an indication of the rapid increase in the use of electric pleasure cars in the suburbs is the record of their growth in New Jersey. Three years ago there were but 139 storage battery cars in the northern part of this state, that is north of Camden, and of these, more than fifty were of the commercial type. At the beginning of this year the number had increased to a total of 440 with the number of pleasure cars more than doubled.

Is the electric the car for the suburbs?

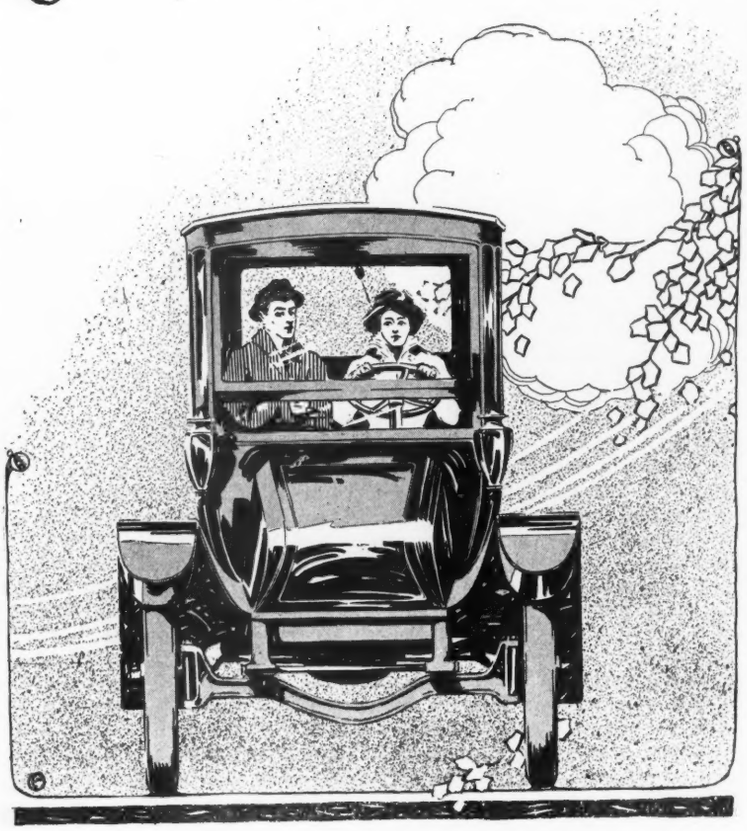
Years ago an affirmative answer would have been based almost entirely on theory—today the actual facts answer most emphatically—Yes!

Teaching Women To Drive Electrics

THERE is no reason why a woman cannot be a good, competent reliable driver, especially of an electric vehicle. Many women today are rivaling the average man in driving ability, and reliability as well, but to arrive at this stage of proficiency a woman must go through a different course of training from a man.

Grasps the Theory

In the first place she is unused to mechanical things, and mechanical experiences. She can grasp the theory and the reason of things but many times lacks the manual experience without which the mental control over the muscles cannot become natural and reflex. Man has a knowledge of the effect of moving levers, etc., but woman must gain it by actual experience.



The temperament of the woman must be taken into consideration when teaching her to drive

Give her this experience and she may make as good a driver as a man, but the teaching stage must continue until all of her control actions related to the car are reflex and not the result of conscious thought. Until this stage of proficiency is reached no woman or man should drive on the public streets.

Many women, more used to society than mechanisms, begin their road training with no idea of road courtesy or traffic rules, and take it for granted, to greater or less extent, that being women, other traffic will give way to them. They—a small class happily—have to be trained very diplomatically to see that a motor car on the street has no sex and no preference, but is only one moving molecule of a vast organization.

While with many there is a prejudice and disbelief in woman's driving ability, she has an equal chance with the men provided she goes through the mechanical and mental experience related to driving through which the sterner sex has already passed. These things should be especially remembered in teaching them the new art.

Encourage Caution

The fault in the woman is her lack of mechanical instinct. If she is driving ahead and wants to turn to the left across traffic she looks behind perhaps, and sees space between her and the vehicle behind sufficent to let her through. She turns, forgetting that this reduces her forward speed and the car behind must slide the wheels to stop in time. This shows a lack of practice and training as to judging speed and distances and no safety device can be figured that will help. The only cure is to teach the driver where the danger lies, and to encourage caution.

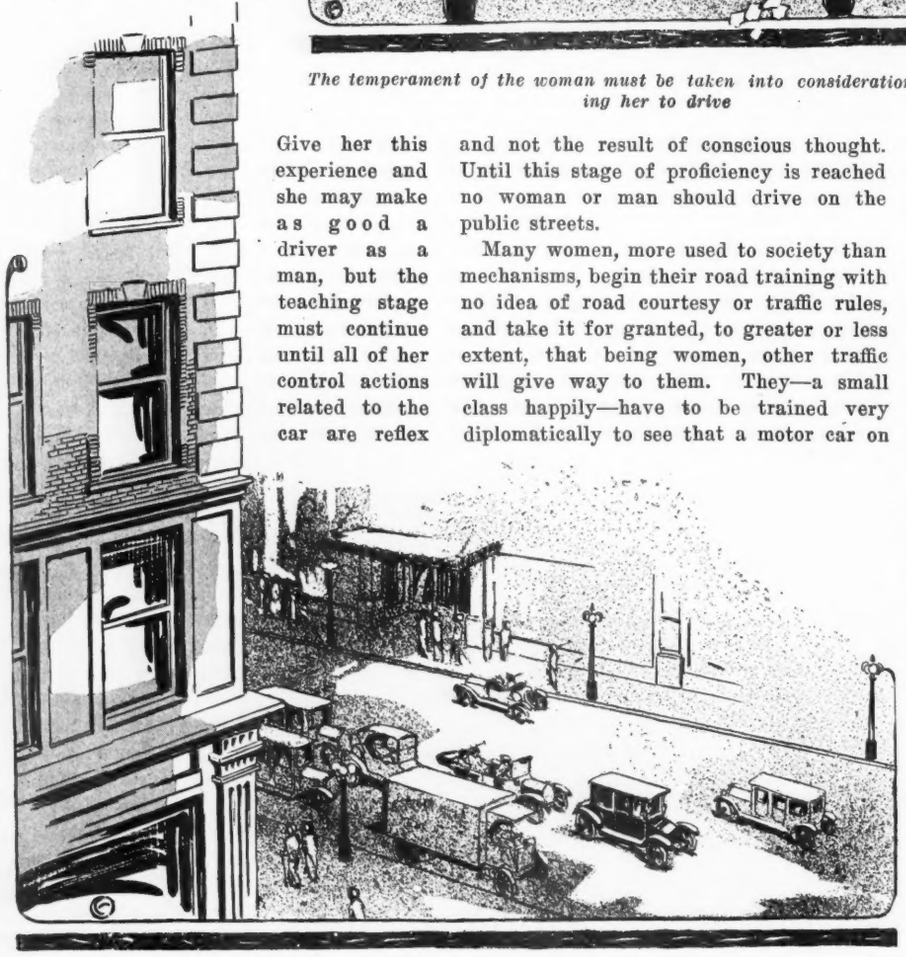
If a woman is walking and steps in front of a man, he stops for her, giving her precedence as a matter of courtesy. This habit perhaps has something to do with her thinking he will do the same with his car. He does—if he can.

These things, acknowledged as typical of a certain percentage of women, must be taken into account in teaching a woman to drive. With a man directions can be given and the rest left to his mechanical instinct—an instinct present in 90 percent of American men. With the woman none of this can be taken for granted and one must ordinarily follow primary teaching methods.

Must Learn Use of Controls

The first thing to explain is of course the controls, and, in general, how the controls give certain results. There is no need to go into the details of battery construction or a discussion of rear axle types, but everything which has to do with the actual operation of the car should be taught. This is the easy part, though many amusing questions are asked during this stage of advancement.

Next comes the road work, and often it is advisable to let the fair driver work

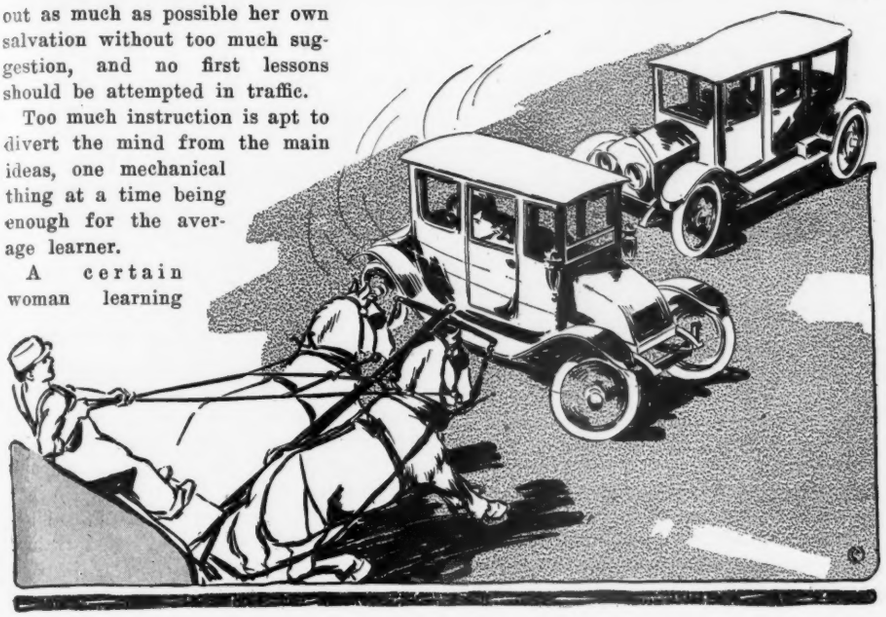


Many women driving electrics disregard the rules of the road. These should be taught as a part of her training. It is a common thing for an electric to hold up all following traffic

out as much as possible her own salvation without too much suggestion, and no first lessons should be attempted in traffic.

Too much instruction is apt to divert the mind from the main ideas, one mechanical thing at a time being enough for the average learner.

A certain woman learning to drive showed great nervousness. The teacher—a relative—was very solictous that she should do the thing right, and hence advised her just what to do, criticised her method at times and by the end of a half hour's lesson had the woman entirely exhausted and too nervous and scary to operate the vehicle. He, on the side, let out the information that he did not think she could learn, she was too nervous.



Few women can gauge speed with accuracy and often turn directly in front of moving traffic

Too Much Criticism Dangerous

The next morning however, entirely unknown to the rest of the house, this woman took the car out alone, worked out the driving by herself without the least trouble and after breakfast took her husband out for an extended drive without any sign of nervousness. Working alone she was not self-conscious as she was when she knew that every move was being critically watched.

A woman when learning grasps the controls as a drowning man grabs a life buoy. One of the first things necessary is to learn to relax both body and mind, that each may work without tension and thus to its best advantage.

After the working of the controls is mastered the work has just begun. It is wrong to stop at this, for every woman should be instructed in traffic rules. She should be shown diplomatically of course, that a woman by reason of her sex has no right of way in traffic. That she should keep to the curb when driving slowly and not hold up traffic by holding to the center of the street.

Center Road Drive Fallacy

It has been said that some of the dealers have recommended this center street driving so that the batteries might be level and not worked at the angle caused by the crowning of the road. This should not effect the batteries in the least, and is an erroneous idea. If the electric battery could not stand being tipped at an angle it would have fallen into disuse on vehicles long ago.

Merely describing to a woman how she should pass street cars and other vehicles is not enough. She must be shown on the road. She must see and experience the method of swinging corners on the right, and learn first hand how every rule of the road operates. Before she be passed as a driver and allowed to drive alone for her own advantage she should know herself competent in every particular, from an understanding of traffic whistles to a knowledge of where she can park her car in business hours, and from the experience of skidding on car tracks to a knowledge of reading the recording instruments on the car so that she can figure the costs and current the car is using if necessary.

There is a great deal of talk at present in the big cities about the woman driver, a talk which is going to have an effect. If the dealers would offset the feeling arising they must take more pains in instruction, and the fair driver must forget that she is a woman when she drives the car, and acknowledge herself but a unit of traffic, giving each vehicle equal rights with its neighbor.

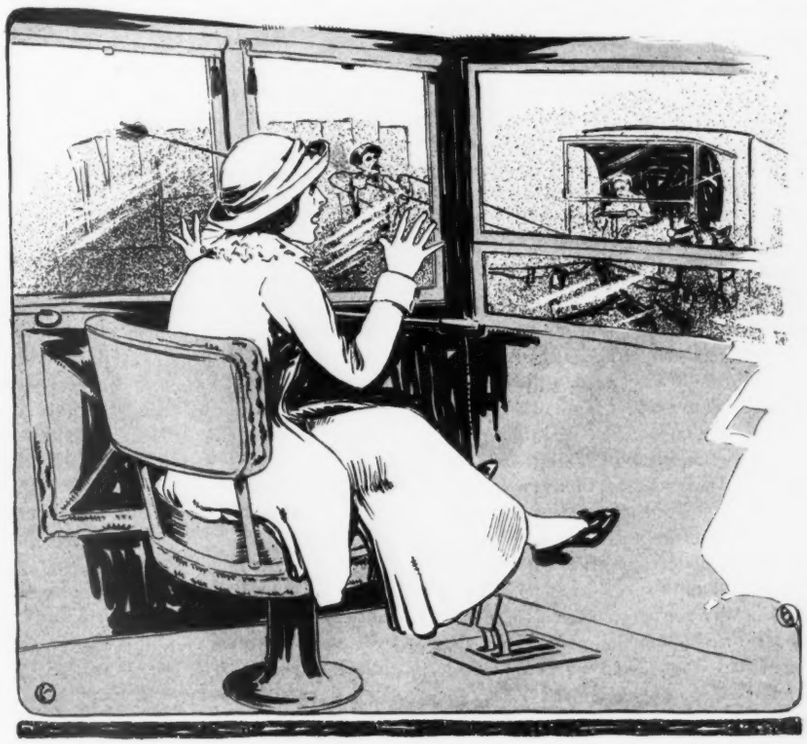
"It takes three times as long on an average to teach a woman to drive a car as a man," said a certain agent who has taught over 200 women to drive cars during the last 4 years, "for as a rule they lack confidence."

Women Lack Confidence

"This lack of confidence is responsible for most of the difficulty they have. They are not used to machinery and although you teach them to steer and they know that to pull on the bar will steer one way and to push will guide the other, when they see danger coming invariably they will pull on the bar, feeling that if they pull hard enough they can hold the car back. They are not mechanical by instinct.

"The same is responsible I think for women holding to the middle of the road. They have not confidence enough in their own driving. If they do get stampeded at sight of a car ahead they feel that they have more leeway in which to wobble than if at the curb.

"Women, some of them, do make good drivers, and get to guage distances with a



Women are more apt to lose their heads at sign of danger and should be taught confidence in driving

keen eye. On the whole they are even more careful in their driving than men, but not so reliable. They lack, as I said mechanical instinct.

"When wet weather comes, as proof of this last statement, there are few women who can drive without non-skid chains. They are not able to guage their own speed and do not seem to understand the existence of such a thing as centrifugal force. As a result, when the pavement is slippery, it is necessary to put chains on the cars.

"I have had many amusing experiences during lesson periods, most of them at times when a woman in the learning stage sees a wagon or motor car coming. Many times when there is nothing to fear and plenty of room for two cars she will drop the controls, throw up her hands and cry, 'What shall I do? What shall I do.'

"I remember one woman in particular who had a regular habit of this nature. I took her out in the car for 15 days in succession and taught her every thing I could think of, until she had everything by heart so far as understanding what was to be done was concerned, yet at the least sign of congestion of traffic, or if danger came up she would drop all controls and cry out for information as to what to do. It took some time before we felt safe to let her take the car out alone. Eventually she made a good driver."

Many women in the early days of the electric had a habit of forgetting to shut off the power, and would think only of the brake. The result of setting the brakes with the power on can be imagined, and the wear and tear on the car as well. This is gotten around nowadays by making the connections automatic, so that when the brake is put on the current is automatically switched off. This saves the machine, the batteries, and the driver, and thus simplifies the whole driving operation.

There are 4,000 women drivers in and about Chicago alone, possibly 90 percent of them driving electrics. Of these drivers but a small per cent really keep the rules of the road. Many of them do not know that the slower moving vehicles must keep to the curb, or if they know it ignore the rule, for a large percentage of the electric cars driven by women on the boulevards keep pretty close to the crown of the road. If the driver of another car wishes to go faster and pass the vehicle he must take a chance on going on the wrong side of the car in passing. If, while the car is passing, the woman takes a notion to turn into the curb he is caught, and this notion of turning suddenly and without much warning is a frequent occurance.

The rules of the road are the basis of safety in driving and the women should learn and observe them, not alone because they are law but for their own safety. For this reason the teacher should study each fair learner and fit the training to her temperament, her previous mechanical experience, and her aptness of learning. Given proper training and careful instruction the woman can drive an electric as well as a man.

Operating Costs for Electrics in the Larger Cities

Rates Vary from $30 to $40 a Month

ELECTRIC vehicle owners are in a position now to be able to tell beforehand approximately what their car will cost each year for operation, due primarily to the work of the Electric Vehicle Manufacturers' Association. This body, composed of eleven electric carmakers, has defined service and the members live up to the definition, as follows:

"Service means free inspection once each month at the garage or service station, provided it is sent to the station at the time specified by the seller. A charge will be made for this service unless the car is delivered at the station on the day agreed upon. No charge will be made for examining wiring, motor, controller, brakes, steering, running gear or an examination of the battery to determine its general condition and whether it is being flushed and cared for.

No Charge for Oiling

"No charge will be made for oiling the entire car, which does not include repacking of bearings or gears, in grease. If inspection develops any needed repairs, due to natural wear, accidents or other causes, the owner will be notified of same and an estimate of the cost of doing the work furnished. This service in no way eliminates the responsibility of the garage in which the car is kept."

The above definition gives the prospective purchaser an idea of what he is to expect in the way for service from the dealer. But most of the dealers give more than that specified above and without charge. All the Chicago agencies have service wagons and day and night service. The service wagon is kept in the garage and waits for a call from some owner who is unable to get his car going. Immediately the service wagon starts for the derelict. The wagon usually carries two extra wheels, a set of batteries and all the necessary parts to get a stranded vehicle in operation.

The car carries new axles ready for installation. The only charge made for this service is for the material, in the event that the break or failure of the part was the fault of the owner. If a front axle breaks from no misuse apparently, the owner is not charged.

Monthly Maintainance Is $40

In Chicago any type of electric is maintained for $40 per month in the public garage. With this outlay all the owner need do is drive the car around town and when through leave it at the house. It is called for and delivered by the garage. The only work which the $40 does not include is repairing of the essential parts.

In Detroit the fixed charges for maintaining an electric range from $30 to $40 per month, according to the size of the vehicle and its battery and whether it is called for and delivered by the garage. A large inclosed car with a forty-two-cell battery probably will take the limit price of $40, whereas a small open car with a thirty-cell battery will cost considerably less. The price includes everything but repairing.

In Kansas City full garage service, including charging, washing, storing and polishing, is $40 per month, which includes calling for and delivering the vehicle to the owner's residence. If the vehicle is within walking distance of the garage the charge is $3 less per month. Should the owner wish to call for and deliver the car himself the charge is reduced to $32 per month.

Denver has low rates compared with those of the more eastern cities. For charging and garaging a vehicle with a fourteen to twenty-cell lead battery $20 is asked. With the exception of coupes and broughams, cars with more than twenty lead cells are charged $25 per month for garaging and charging. Coupes and broughams cost $30 per month.

Los Angeles, Cal., has an average monthly charge of $35 for closed cars and $30 for open cars, which includes calling for and delivering the vehicle, charging, washing, polishing, oiling and inspection. However, should the batteries require more than 300 k. w. hours per month, an extra charge of 6 cents per k. w. hour is made. If the owner wishes to call for and deliver the car himself a deduction of $5 is made from the prices quoted. For $10 extra the number of deliveries and the extent of charging may be unlimited.

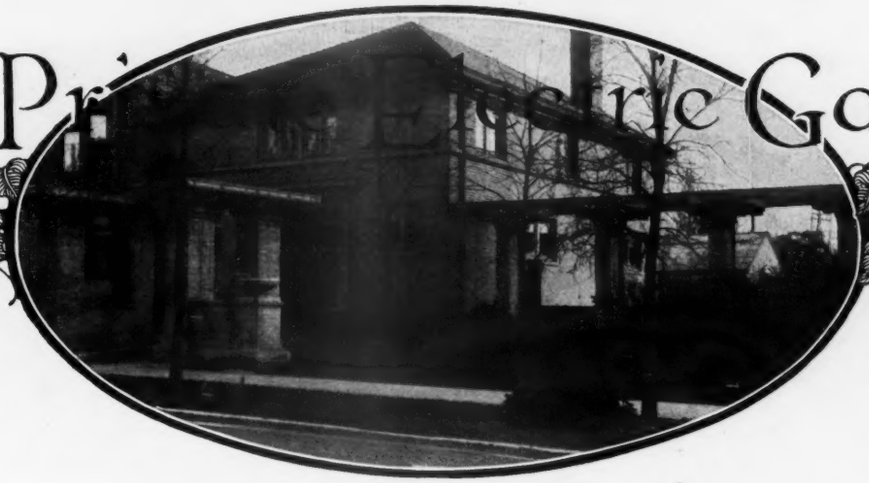
Rates in Other Cities

Minneapolis, Minn., St. Paul, Minn., and Washington, D. C., have the same rates. This is $35 per month, which covers day and night service in calling for and delivering the car, washing, polishing, charging and inspection and making minor repairs.

The prevailing rates in Milwaukee, Wis., and Dayton, O., are practically the same, being $35 per month for taking care of the vehicle throughout and calling for and delivering it to the owner.

In fact, in all the large cities of the country, service for the electric car owner at a nominal cost has been brought up to a high standard.

The Private Electric Garage



Hints for the Car Owner

Necessary Equipment for Charging

GUMPTION makes garages possible. The average owner of an electric vehicle has read all about batteries and motors and how to oil the car, but the work of caring for the vehicle sometimes is beneath his dignity or too irksome. Four years ago little was known about charging batteries by the average electric car owner, but with the makers of accumulators issuing instructions and volume upon volume on the construction and action of the battery, the owner of today knows practically everything to be known. The battery really is all that requires attention, and if the owner only would use his knowledge of this part, his private garage would be a success. With simplicity and sturdiness in battery construction, all the owner need do is connect the charging plug and then take a few hydrometer readings, or if he charges by the meter method, read the meter a few times during the actual charging operation.

Operation of Charging Simple

Four years ago such simplicity was not to be found and it took a man who knew something to care for a set of batteries, but the modern battery has been brought to such a state of perfection that the little care that is required may be given it by a man without mechanical experience.

Battery charging in the private garage has long been a subject for discussion and it appears that with the proper installation and a reasonable amount of attention vehicle battery charging may be done by the car owner in his garage. But whether the time, trouble, and cost totaled, will effect a saving over the price asked by the public garage is hard to answer. The public garage, of course, has men stationed at the panel board watching the meters carefully and taking hydrometer readings regularly, and it is up for consideration whether the private owner who does his own charging is as watchful as the garageman. It is reasonable to suppose that the private garage may be equipped with the proper installation for doing vehicle battery charging, but all depends upon the man in charge as to whether the batteries receive the proper care during charging.

One objection to the private garage, in which the car is taken care of by the owner, is that usually only one in the household understands the proper method of charging. This is the car owner, and he takes so much pride in his work that no one else is permitted to meddle with the apparatus. But the owner sometimes is called out of town, to remain perhaps a few days, and in that event his wife and children must leave the car in the garage until his return.

Another objection which has been overcome largely is washing and polishing the car. He will charge the batteries and tinker around the motor, but seldom will the owner wash or polish his car. He gets the hired man to do that work and if no hired man is around, the cost is but $1 at the public garage. Under contract with the public garage the car receives many washes and polishes, which it may not need, but when taken care of by the owner the car is cleaned only when necessary, which averages about once each week. So it is evident that all the private owner need do is to properly charge his batteries, and there is no reason why he cannot do it and do it well. So simple are the instructions given by the maker of the batteries that there is very little chance of failure. The best method is to charge by the hydrometer. That is, keep charging until the hydrometer reading is what the maker specifies, usually 1.28—and then disconnect the charging plug.

Types of Installations

Where alternating current only is available, a rectifier of some type must be used, the use of a motor-generator set hardly being worth while for but one or two cars. The mercury arc rectifier has come into wide use within the last few years and is an efficient and simple device, with a low up-keep cost. A rectifier of 30 amperes capacity is large enough for charging an ordinary set of vehicle batteries, but certain types of Edison batteries require rectifiers of larger capacity.

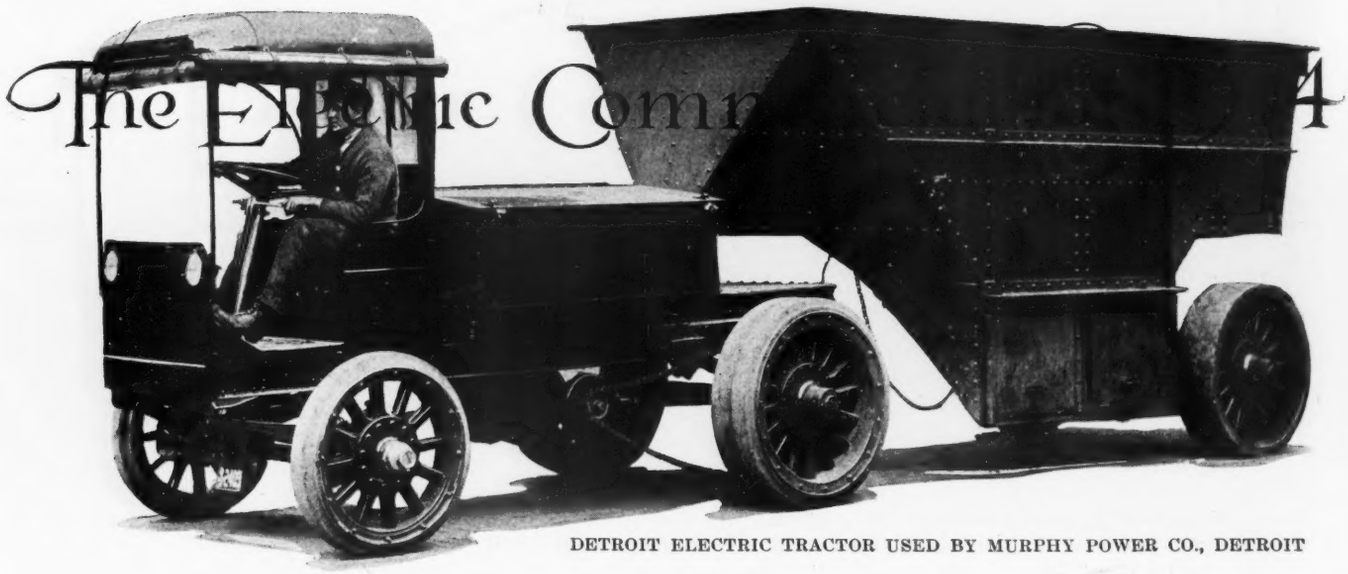
Rectifiers of ample capacity for charging one or two sets of vehicle batteries may be purchased for about $200 to $300. The up-keep cost of these rectifiers confines itself usually to the replacement of new tubes. These tubes are in most instances guaranteed for a certain number of hours burning. A tube guaranteed for 300 hours continuous burning costs about $20.

Very satisfactory equipment for a private garage capable of using 110-125 volts direct current is a charging rheostat of the wall type, with meter, switch, fuses, cables, etc. This make a simple installation and one which does not require more than ordinary care. The charging rheostat is in use at this time in the majority of private garages where direct current is available and a talk with some owners of this type shows that the results obtained are very satisfactory.

Cost of Charging Apparatus

In Detroit, the Anderson Carriage Co. will install a charging rheostat complete for about $47 which includes the instrument, and all the necessary meters and plugs. After installation a man is sent around to charge the batteries to see that the rheostat is working properly and after he decides the installation is in good working order the owner takes the matter in hand. If the owner wishes to install the apparatus himself he may do so and the company will send a man around to test it for him. This is but one example of the methods used to relieve the owner of all unnecessary risk. Any electric vehicle concern will undoubtedly give like service.

In some instances direct current of 220 volts is in the main line. Where batteries requiring high voltage are to be charged, frequently, the rheostat perhaps is the most economical type of instrument, but where the charging is periodic and the batteries require low voltage, a motor-generator set is a good machine. The motor-generator set here comprises two direct current machines. The line voltage is made to operate the motor and this in turn operates a dynamo which generates the proper voltage. Such machines are being manufactured by all the large electrical houses, some of them building special types for electric vehicle batteries.



DETROIT ELECTRIC TRACTOR USED BY MURPHY POWER CO., DETROIT

ARGO

INCORPORATING several improvements that add to the radius of battery mileage and including several refinements, the 1914 Argo, manufactured by the Argo Electric Vehicle Co., of Saginaw, Mich., is made in two chassis capacities, one of 1,000 pounds and the other of 2,000 pounds, on either of which can be mounted three types of bodies—open express, platform and closed panel. The prices for these range from $1,900 to $2,400.

Among the 1914 adoptions is an interlocking arrangement between the controller and the brake, whereby the application of the latter cuts out the current and furthermore makes impossible the operation of the car with the rachet brake set.

The Weston-Mott design of axle, used in 1913, has been retained but strengthened for the coming season.

Tires are larger on both models, 34 by 3-inch tires being fitted on the 1,000-pound truck and 35 by 3½-inch tires on the heavier truck. Although not recommending the use of pneumatic tires, the company furnishes either special electric solid tires or special electric cushion types at the option of the purchaser.

Exide-Hycap and Edison batteries are listed, a forty-cell equipment being used on the former and a sixty-cell battery on the latter. An improvement in connection with the use of the Edison cell is that of assembling the battery in cradles, which are readily withdrawn at the side of the car for inspection, filling the cells with water, etc. With this normal battery equipment a delivery radius of 40 to 50 miles on city pavements is guaranteed. The 1,000-pound vehicle is rated at 13 miles an hour and the 1-ton truck at 12 miles an hour. With Exide battery equipment, four forward speeds and two reverse are given, and with the Edison equipment, four forwards and three reverse.

A complete double set of internal expansion rear wheel brakes is used. On the 1,000-pound model, the brake drums, measuring 12 inches in diameter and 4½ inches in width, accommodate the two expanding sets of shoes, each of which is 1½ inches wide, yet these drums are exceptionally light, weighing only 14 pounds each. On the 1-ton model, 14-inch drums, having the same face width and accommodating the same size of expanding shoe, but each weighing 5 pounds more, are used.

The company continues its policies of driving direct by shaft through herringbone and bevel gear reductions, mounting the motor immediately in advance of the rear axle and locating the battery under the frame and slightly in advance of the center of the car.

In the matter of weight distribution, when the chassis is loaded, 75 per cent of the weight is supported on the rear and 25 per cent on the front wheels.

ELECTRIC COMMERCIAL TENDENCIES

ELECTRICALLY-DRIVEN commercial cars for 1914 as a whole are characterized by several features that make them better fitted for dovetailing into the transportation systems of the various businesses for which they may be designed. One of the chief evidences of this tendency is the material increase in the radius of action of the new electrics. Another is the number of new light business wagons of 1,000 pounds capacity and under, thus extending the range of service in which they may be employed profitably.

A similar end is sought in making the trucks as a whole more capable of quick and easy repair and replacement of parts. This occurs in the making the batteries more accessible in locking control boxes automatically so that cars may not be started when undergoing charge and in the standardization of the wheels and tires.

Increase of the radius of action of electric vehicles this year has been obtained by two methods, the first, by using what is said to be a slightly more efficient type of batteries which provide a greater ampere-hour capacity without an increase either in bulk or weight. Secondly, by minor changes throughout the chassis by which there is less loss due to friction or weight in the transmission.

Several makers are taking every precaution to reduce current losses between the battery and the motor, in some cases by using weather-proof conduits in which the wires are carried; in other cases by using heavier section wire; and in others by grouping the various electric units such as motor, controller and battery more compactly so that the length of wiring is greatly reduced.

Shaft-drive is making its appearance in real earnest in the smaller capacity vehicles, those under 2,000 pounds capacity. Not a few of the concerns using these new drives are fitting a worm-reduction back axle.

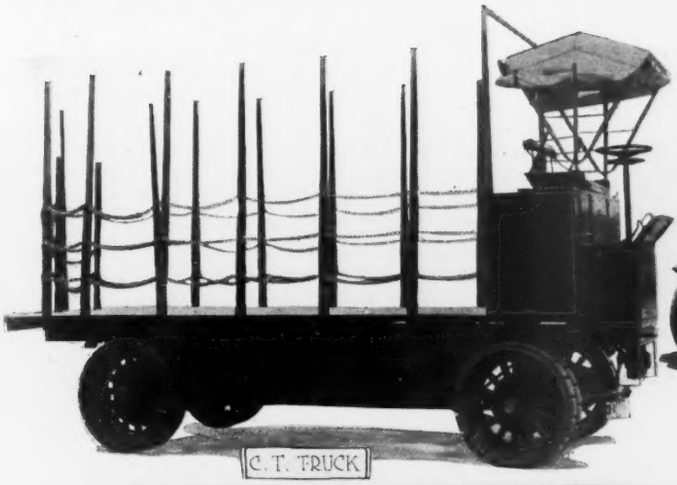
Where concerns fitted 32-inch sizes they have often increased them to 34-inch sizes and where the cross section was 3 inches it has been increased to 3½ inches.

ATLANTIC

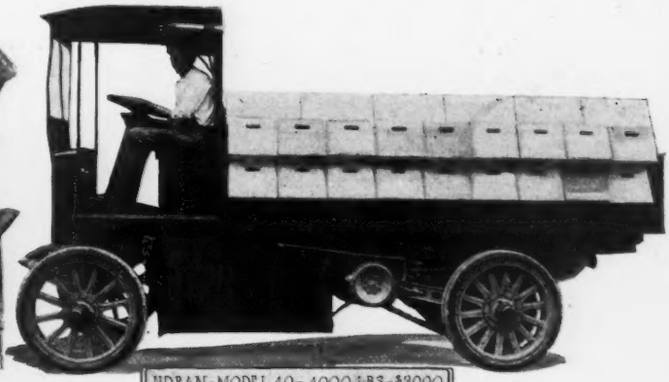
IN adding a new 1,000-pound model to its four 1913 types for 1914, the Atlantic Vehicle Co., of Trenton, N. J., makes its debut in the shaft-drive field. This shaft-drive vehicle, brought out 2 months ago and which combined with the 2,000, 4,000, 7,000 and 10,000-pound trucks of this year gives the maker a formidable line, employs a bevel reduction at the rear axle. An option of battery location is permitted, the battery being placed either under the driver's seat or beneath the floor.

The battery equipment also is optional, either forty-four cells Exide or Edison A-4 or A-6 cells. The new model has a speed of 18 miles an hour empty, 15 miles an hour with load. The motor is suspended at three points, the transmission from it to the axle being through a conventional propeller shaft with two universals. The use of pressed steel side members, which are narrowed toward the front in order to reduce the diameter of the circle in which the truck may be turned, is a departure in frame construction. Timken axles are used.

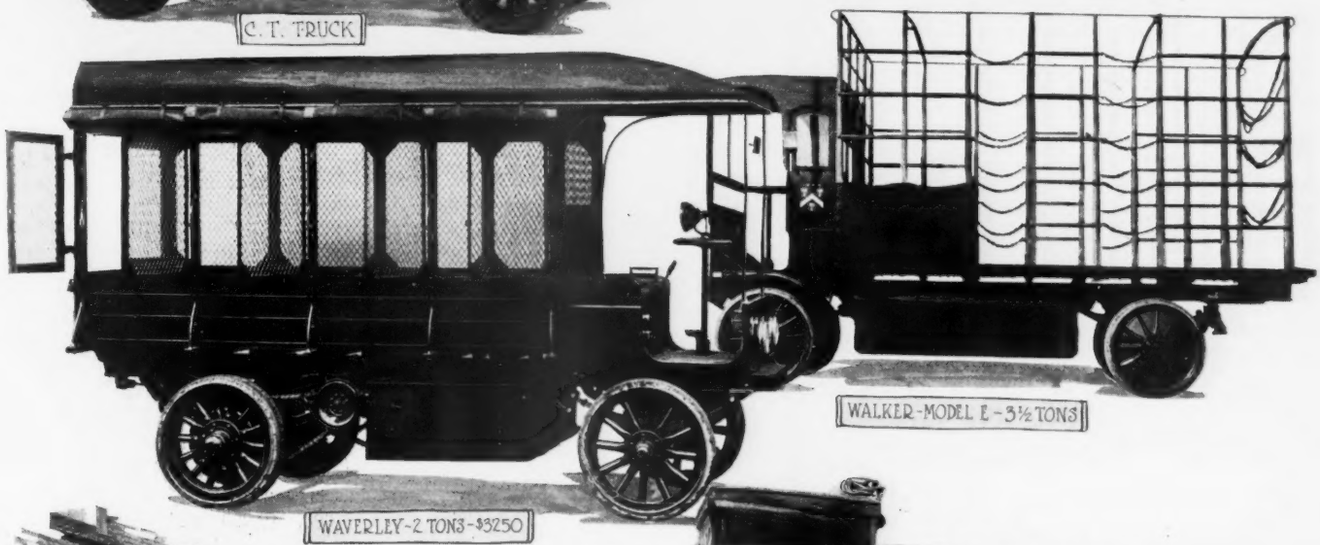
The tire equipment is 36 by 3 all around,



C. T. TRUCK

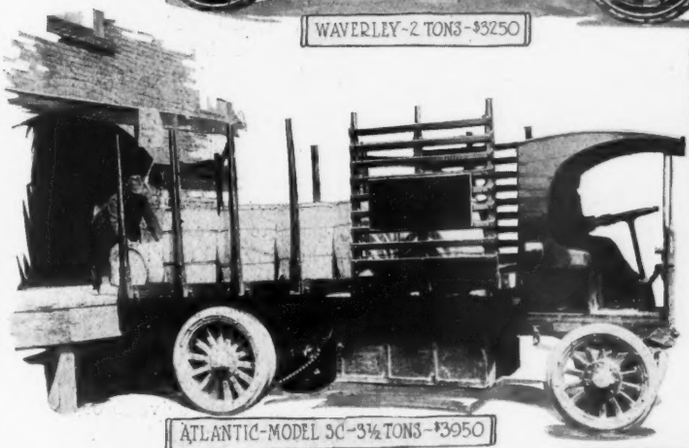


URBAN-MODEL 40-4000 LBS-$3000

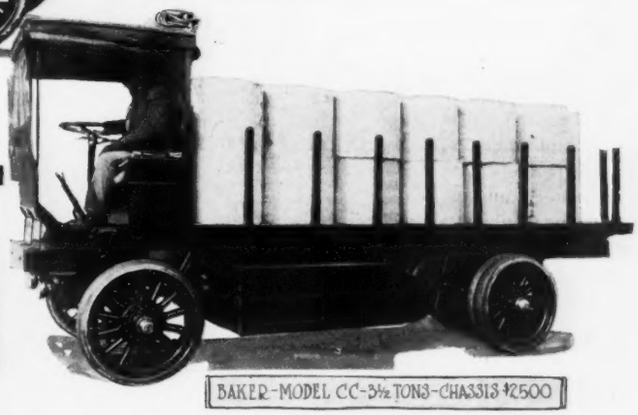


WAVERLEY-2 TONS-$3250

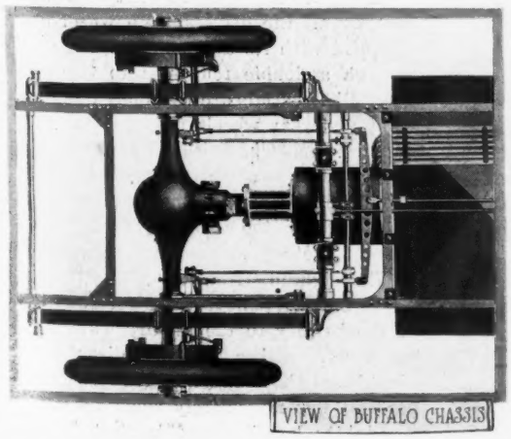
WALKER-MODEL E-3½ TONS



ATLANTIC-MODEL 3C-3½ TONS-$3950



BAKER-MODEL CC-3½ TONS-CHASSIS $2500



VIEW OF BUFFALO CHASSIS

BAKER-MODEL U-2 TONS-$3355

with Goodrich or Goodyear optional and the Motz cushion recommended.

On the models carried over from this year, few if any changes are noted, and the prices remain practically the same. Approximately 15 per cent greater mileage per battery charge is listed, due to reductions in chassis frictions, the result of closer workmanship and better mounting of bearings, etc.

In the conventional Atlantic chain-driven chassis the battery is mounted beneath the frame and amidship, and the motor between the rear axle and the jackshaft, the latter being immediately in the rear of the battery case. Drive from the motor to the jackshaft is through a Morse silent reduction, and the second reduction is in the side-chain drive between the jackshaft and the rear wheels. Structural steel channel is used in the frame construction, which is regularly mounted on semi-elliptic springs. Two sets of brakes are fitted, one a contracting set on the jackshaft, the other an expanding set on the rear wheel drums.

BAKER

THE Baker Motor Vehicle Co. of Cleveland, O., has announced four chain-driven models with capacities of 1,000, 2,000, 4,000 and 7,000 pounds. Bodies are optional, the maker following his policy of fitting any style of body that best meets the requirements of the individual purchaser.

All four models are identical in general chassis design, having the underslung battery and single motor with drive from the motor to the countershaft through silent chain and from the jackshaft to the rear wheels through roller chain. These chains are inclosed on the heavier trucks.

An optional battery equipment, either of lead or Edison cells, the latter being extra, is listed. The lead battery is made up of forty-two cells, generally arranged in six trays of seven cells each. The number of plates per truck varies according to the increase in load capacity, nine plates being used in the 1,000-pound vehicle; eleven in the 2,000-pound; thirteen in the 4,000-pound and seventeen in the 7,000-pound. When Edison equipment is fitted, A-4, A-6, A-8 and A-10 cells are used on the 1,000-pound, 2,000-pound, 4,000-pound and 7,000-pound trucks respectively.

All Baker vehicles for 1914 are equipped with pressed steel channel section frame members. The front axle is an I-beam type and the rear axle is rectangular.

Two sets of mechanical brakes are regular equipment, a set of internal expanding brakes on the rear wheels and an expansion set on the jackshaft being the customary location. The 7,000-pound truck is the exception, both sets being of expanding type and placed on the rear wheels.

BAILEY

FEATURING battery mileage and speed as selling points, S. R. Bailey & Co. of Boston, Mass., have introduced two styles of commercial vehicles in the 1914 electric salon, one a light service runabout with baggage carrying facilities at the rear of the seat and the other a 300-pound delivery wagon mounted on a roadster chassis.

Two changes are noted in the Bailey vehicles for 1914, the adoption of a steering gear of the screw and half-nut type and the installation of a motor of greater capacity than before.

The runabout or light service car, which is intended for use by telephone, electric light and power companies, is equipped with sixty cells of either A-4 or A-5 Edison battery, the price varying according to the number of cells carried. The inside body dimensions are 42 inches in height and width and 44 inches in length. The car is geared to 20 miles an hour with a mileage radius of 60 to 80 miles per charge. Thirty-three by 4-inch special electric pneumatic tires are fitted on Q-D rims.

As regards chassis design, the battery is carried under a Slocum hood in front. The motor is suspended under the rear hood and drives the jackshaft through a Morse silent chain. The drive from the jackshaft to the rear wheels is by side chains. There are two sets of brakes, a contracting set acting on 12-inch drums on the rear and a similar set acting on 14-inch drums on the jackshaft.

Chassis features include wood side members used in frame construction, semi-elliptic front and elliptic rear springs, control centered in the steering wheel on the left side and controller mounted above the steering wheel.

The Bailey company also has a new four-passenger roadster which has practically the same specifications as the business roadster runabout now listed, excepting that the latest model has a 132-inch wheelbase and a battery radius of 60 to 80 miles per battery charge at an average speed of 20 miles per hour. Its battery equipment will be sixty cells of Edison A-6 type.

BORLAND-GRANNIS

SOME time ago the Borland-Grannis Co. of Chicago announced a 1,500-pound delivery wagon in open and closed body styles, but owing to the pressure of its pleasure car trade the maker has not started the marketing of this model as yet and may be compelled to defer its manufacture for some months. This contemplated vehicle, however, is included in the specification table of this issue.

BUFFALO

THE two 1913 models of 1,500-pound and 2,000-pound capacity will be continued for the coming year with few if any changes by the Buffalo Electric Vehicle Co. of Buffalo, N. Y.

The chassis, which is of the same design in both models, has several distinctive features, one in particular being the forming the motor as a unit with the rear axle by inclosing the short propeller shaft entirely and having the shaft form a rigid uniting element between the motor housing and the axle casing. The necessity for a universal joint in the shaft is obviated by securing a universal action in the propeller shaft where it unites with the motor by an internal gear clutching. The forward end of the propeller shaft carries a pinion which engages an internal gear on the motor, the meshing of one gear with the other giving the necessary flexibility.

The rear axle is double-reduction floating type fitted with roller bearings. The front axle is a Timken product.

Mechanical braking is used. Both sets of brakes are mounted on the wheels, the service set expanding, the emergency set contracting, and both being pedal applied. The chassis is featured by a pressed steel frame, semi-elliptic springs and battery carried underneath the frame.

Thin-plate lead batteries are standard, forty-four thirteen-plate cells being used in the 1,500-pound truck and the same number of fifteen-plate cells in the 1-ton vehicle.

Buffalo vehicles are rated at 8 to 12 miles per hour with a 45 to 60 mile battery range per mile. Tires are 36 by 3½ inch size, S. A. E. standard.

COMMERCIAL TRUCK

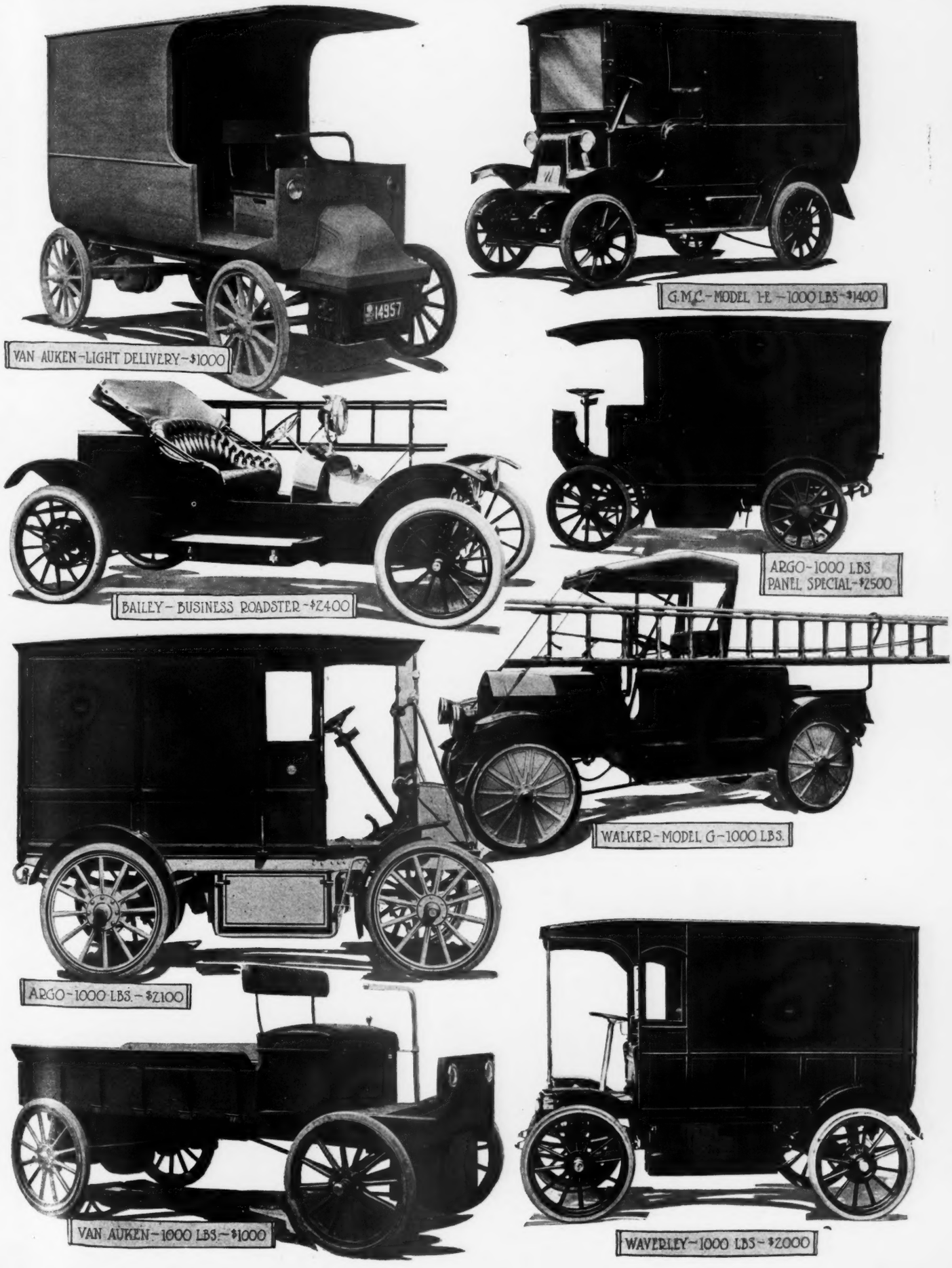
RETAINING all of its 1913 models for the 1914 market and incorporating only minor changes, the Commercial Truck Co. of America announces a slight reduction in price for the coming season on all vehicles, which are made with the following chassis capacities: 500, 1,000, 2,000, 4,000, 7,000, 10,000 and 14,000 pounds. Larger tires are used, the company having standardized on 36-inch sizes for all models, the width of the tire section varying to meet load requirements.

A variety of drives are used on these vehicles. The 500 and 1,000-pound wagons carry the motor under the chassis and drive by shaft to a worm-driven rear axle, the motor housing and rear axle being practically a unit, thereby eliminating the necessity of universal joints in the drive shaft.

In the 2,000-pound and 4,000-pound models, two motors, one for each rear wheel, are used. These drive through bevel reductions to an internal gear on the wheel hub.

On the remaining three heavy trucks, all four wheels are drivers, each wheel being equipped with its own motor which drives through a double reduction to the wheel hub. Differentials are eliminated and both front and rear wheels are used for steering purposes. The axles are of forged steel and made in two sections, separated by a spacing member. The motors are held on arms between the axle sections. The use of four motors on four wheels gives an equal weight distribution.

The battery policy of the company is to fit the battery to the requirements of the purchaser. Either lead or Edison is furnished and the number of cells and plates per cell depend entirely upon the terms. A slightly heavier wire is used for con-


VAN AUKEN-LIGHT DELIVERY-$1000
G.M.C.-MODEL I-E-1000 LBS-$1400
BAILEY-BUSINESS ROADSTER-$2400
ARGO-1000 LBS. PANEL SPECIAL-$2500
WALKER-MODEL G-1000 LBS.
ARGO-1000 LBS.-$2100
VAN AUKEN-1000 LBS.-$1000
WAVERLEY-1000 LBS-$2000

nections between the electrical units. The carrying of these wires in patented ducts and taping and the soldering of connections have been discontinued. The controller, as heretofore, is protected by a metal covering of asbestos lined steel.

Regulation of all speeds on Commercial trucks is through a steering type of controller wheel mounted beneath the steering wheel. The speeds on the models of 1-ton capacity and less have been increased from 15 to 18 miles an hour; the speed of the trucks of over 1 ton is regulated so as to meet the requirements of municipal traffic; and the 7-ton wagon can make between 6 and 7 miles an hour under load. The battery mileage is approximately 15 per cent in excess of the present year, due entirely to the elimination of friction in the chassis parts.

COUPLE-GEAR

LISTING a variety of sizes ranging in load capacity from 2,000 to 14,000 pounds, Couple-Gear trucks will be manufactured in 1914 with the motor incorporated in the wheel as formerly.

The 1914 innovation of the company is a low-body vehicle. The floor of the body is 40 inches and the floor of the driver's cab only 28 inches from the ground. The driver sits in advance of the front axle and the battery is swung beneath the frame and between the axles. This new body arrangement gives an even distribution of weight over the four driving wheels.

It is almost impossible to give battery equipment, as this is generally altered to suit the requirements of the individual purchaser. On the 7-ton four wheel drive tractor forty-eight cells of lead battery, with twenty-five plates to the cell, are used. This battery is divided into six trays of eight cells each and may be carried either under or over the floor board. On the standard four-wheel drive chassis of 10,000-pounds capacity, the standard equipment is forty-four cells, divided into six trays, two with four cells each and four with eight cells each.

The wheel motors used in all capacities are rated at three horsepower. Control is through five forward speeds and an equal number of reverse. Service brakes are external types operating on each wheel, the drum diameters measuring 17 inches with 2½-inch widths. The emergency brake is a controller type.

The chassis are practically standardized and include semi-elliptic springs and I-beam frame constructions for trucks as well as for tractors.

The Couple-Gear Freight-Wheel Co. of Grand Rapids, Mich., in addition to supplying vehicles direct to the consumer, sells its wheel unit to several concerns in large cities who manufacture chassis to meet the requirements of the trade. Giving every flexibility, the couple-wheel construction makes possible the utilization of parts of existing horse equipment by fitting a front axle unit, comprising road wheels with driving motors and adding the necessary battery equipment and control facilities.

The possibilities of the couple-wheel construction have been demonstrated in New York and Boston, where the two-wheel tractor has been adapted to 5 and 6-ton loads, by using the horse equipment minus the front axle. For loads ranging from 2,000 to 5,000 pounds, drive through two wheels is sufficient, but for capacities from 6,000 to 12,000 pounds, all four wheels are needed as drivers.

DETROIT

WITH a progressive production policy fixed and an entirely new line of vehicles on the market, the Anderson Electric Car Co. of Detroit, Mich., long a leader in the manufacture of pleasure vehicles, enters the truck field in real earnest now.

In each of the new models, which have load capacities of 1,000, 2,000, 4,000, 7,000 and 10,000 pounds, have been incorporated the new Anderson features of design. These five vehicles may be divided into two groups, shaft-driven and chain-driven. The two shaft-driven trucks are the 1,000-pound and 1-ton types. The chassis design in chain-driven and shaft-driven models is similar but quite different from that used this year.

The battery is mounted under the frame amidships, but is divided into two trays, one at the right side, the other at the left, and with sufficient space left between them to accommodate the propeller shaft. The motor is located ahead of the battery and between its forward end and the front axle. In the shaft-driven types the propeller shaft from the motor connects direct with the rear wheel, using two universal joints and having but one reduction at the axle. In the chain-driven models, the propeller shaft from the motor transmits to the jackshaft located immediately in rear of the battery, and thence power is transmitted by side chains.

The merit of the new chassis arrangement is that the entire electrical system of the truck—the wiring from the battery, the electric motor and the controller—is grouped into a small space scarcely 4 feet square. The grouping of these essentials in this way cuts down enormously the amount of copper wiring and consequently reduces the voltage drop in the line between the battery and the motor. Another advantage from this grouping is that the motor is entirely taken away from under the load platform.

Dividing the battery as has been done adds to its accessibility and insures better attention. In the larger models the battery is mounted in trays carried on rollers so that when the side of the battery box is opened, forming an extension platform, the battery tray can be pulled out on this platform for inspection, filling of cells with water and testing. On each door is a catch to prevent the battery rolling off the platform, but when it is necessary to entirely remove the battery, this catch may be released and the battery can be rolled onto a truck or repair platform as desired.

A departure in Anderson construction is that of using pressed steel frames in the chain-driven models, the side members of the frame being bottle-necked or narrowed in front to reduce the space needed in maneuvering. On all models the horizontal type of controller is mounted under the steering wheel, the latter being on a column inclined at approximately 35 degrees. On the steering wheel is a cutout switch.

Double mechanical brakes are fitted to all models. On the shaft-driven types there are double rear axle brakes, one set internal expanding, and the other set, external contracting. On the chain-driven models the service brakes are contracting ones on the jackshaft and the emergency ones expanding types on the rear wheels. The emergency brakes are interconnected with the controller and when applied, cut out the current and make it necessary to bring the controller back to neutral before the current can be brought on. This brake has a ratchet for holding the brake applied.

The Anderson company is grouping the controller, electrical instruments and lamps under a short curved bonnet in front of the lash, where they are well protected, well removed from the battery and most accessible, since raising the small hood discloses them all.

The general equipment includes hub odometers and solid tires. Edison battery is regular equipment on all models, the A-6 cell being used on the ton vehicle, having sixty cells with an ampere-hour capacity of 225; the A-8 cell on the 2-tonner with 300 ampere-hour capacity; and the A-10 cell in the 3.5-tonner.

FRITCHLE

CHANGING from chain to shaft drive with a bevel rear axle, the Fritchle Automobile and Battery Co. of Denver, Colo., offers a single model, a 1,000-pound delivery wagon. The 1913 chassis has been overhauled and the vehicle improved by an increase in tire sizes, 34 by 4-inch tires having replaced 32 by 3½-inch shoes used this year.

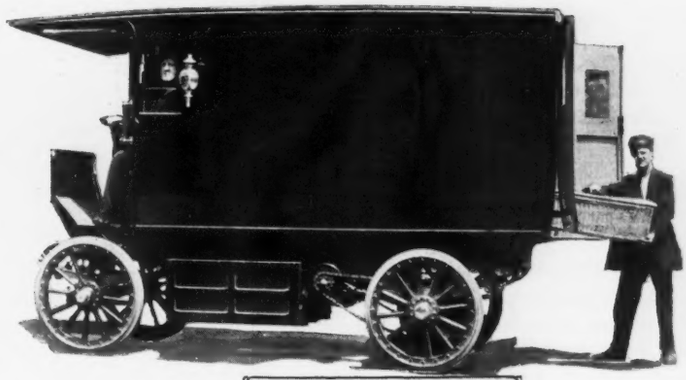
Since its inception, the Fritchle company has manufactured its own batteries and motors. The battery is a lead type of thirty-two cells with a 160-ampere hour capacity and affording a mileage of from 50 to 70 miles per charge. The weight of the battery is 900 pounds.

Fritchle chassis construction is distinctive. The frame is of armored wood and elliptic springs are carried all around, two factors that should make for very flexible suspension and a construction especially easy on batteries. Front and rear wheels are carried on annular ball bearings.

G. M. C.

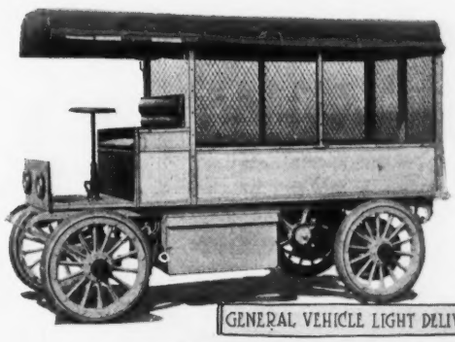
EMBODYING a few refinements of detail but following the same lines of design and construction that has been pursued since their inception, G. M. C. trucks for 1914 show no radical changes from

ATLANTIC-MODEL K-$2200 CHASSIS

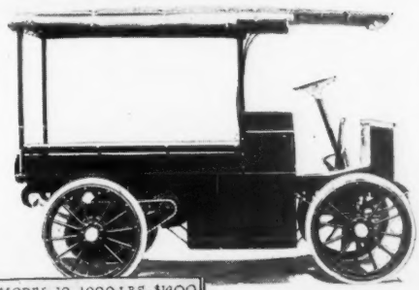


BAKER-MODEL O-1 TON-$2835

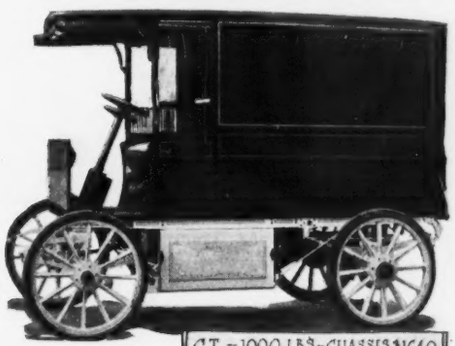
GENERAL VEHICLE BUS



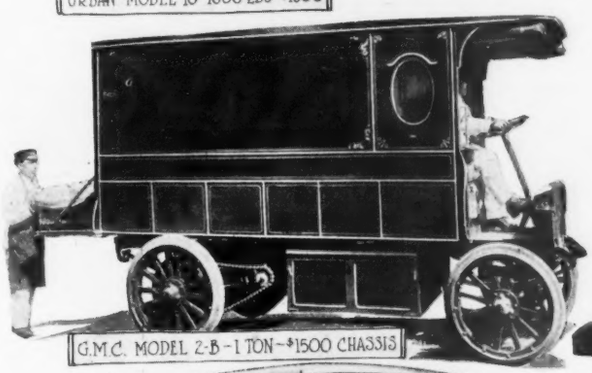
GENERAL VEHICLE LIGHT DELIVERY



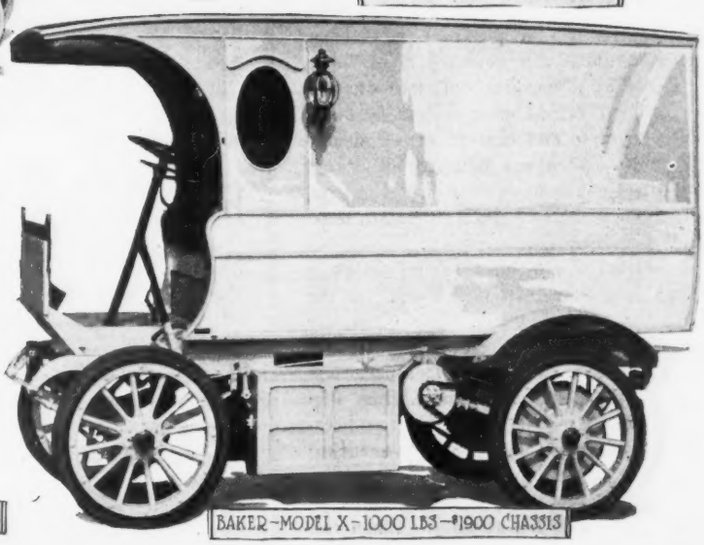
URBAN-MODEL 10-1000 LBS-$1800



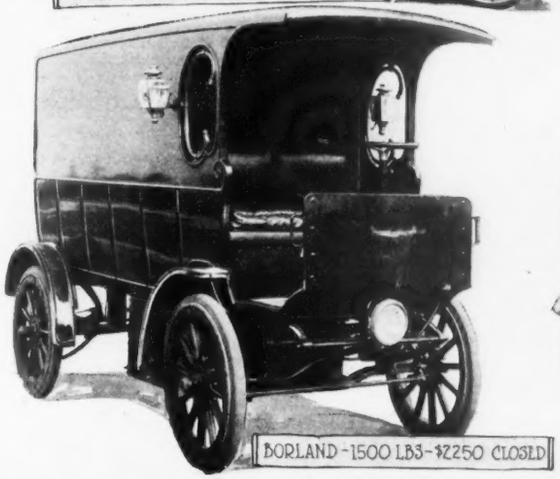
C.T.-1000 LBS-CHASSIS $1640



G.M.C. MODEL 2-B-1 TON-$1500 CHASSIS



BAKER-MODEL X-1000 LBS-$1900 CHASSIS



BORLAND-1500 LBS-$2250 CLOSED

those vehicles marketed by the General Motors Truck Co. of Pontiac, Mich., in 1913. As the company aims to produce trucks that will meet the requirements of the buyer rather than making the purchaser's business suit the truck, the Pontiac corporation lists eight models, with a selection of three wheelbases giving a gamut of twenty-four capacities from which to choose, in order to make its vehicles adaptable to varied industries.

The capacities of the G. M. C. line are as follows: 1,000, 2,000, 3,000, 4,000, 6,000, 8,000, 10,000 and 12,000 pounds, and the wheelbases are known as A, B and C. Wheelbase A, the shortest, is suited for the cartage of heavyweight merchandise such as steel billets; wheelbase B is medium and suited for the transportation of such merchandise as flour; and wheelbase C is the long one needed in the transportation of furniture, paper boxes, etc.

The amount of battery equipment and the make of battery are determined by the necessity of the buyer and the service demanded, and the price is based on the equipment necessary. Frequently the company experiments for some time to secure the most satisfactory battery equipment in the case of large installations.

G. M. C. trucks carry special electric solid or cushion tires, according to the field of activity in which the vehicle is to engage. In some instances the tires are larger than those of this year.

In designing its truck, the G. M. C. maker has aimed to keep the amiable disposition of the garage caretaker unruffled by locating the battery high under the seat where it is easily inspected, easily filled with water and accessible for cell testing.

GENERAL VEHICLE

ALTHOUGH the 1914 line of the General Vehicle Co., of Long Island City, will represent trucks and delivery wagons ranging in carrying capacity from 750 pounds to 5 tons, the intervening sizes being 1,000, 2,000, 4,000 and 7,000-pound machines, the 1,000-pound vehicle is the only one that differs radically from previous models in that it has a shaft drive with a worm type of rear axle and the battery is carried under the forward hood, as is the motor of a gasoline car, two distinct innovations. Except that it will be fitted with solid tires and carry the various improvements which are being incorporated in the 1914 chain-drive models of the company, other details of this vehicle are lacking at present.

Inspection of all the 1914 models show several improvements not noted in the G. V. line of past years. The controller now is housed in an indestructible and fireproof metal box, on which is located a new cutout switch. This is a handle, from 4 to 6 inches long, which the driver, on leaving the truck, can remove, thus preventing tampering with the vehicle and making it impossible for irresponsible persons to start the truck in his absence. When the

SPECIFICATIONS OF ELECTRIC COMMERCIAL VEHICLES FOR 1914

NAME AND MODEL	Chassis Price	Load Capacity in Lbs.	Body Style	Width Loa Space	Length Load Platf'm	Length Over all	Wheelbase	TIRES Front	TIRES Rear	Battery Make and No. Cells	Ampere Hour Capacity
Argo, K-10	$1,750	1,000	Open Ex.	3'6"	7' 6"	10' 9"	86	34x3	34x3	Exide, 40	138.5
Argo, K-10	1,750	1,000	Stake	5'6"	8' 6"	11' 9"	86	34x3	34x3	Exide, 40	138.5
Argo, K-20	2,000	2,000	Open Ex.	3'6"	8' 4"	11'7½"	96	35x3½	35x3½	Exide, 40	102
Argo, K-20	2,000	2,000	Stake	5'6"	9' 6"	12' 7½"	96	35x3½	35x3½	Exide, 40	102
Atlantic, 10-B	.....	1,000	Opt.	3'4"	6'11"	11' 8"	102	36x3	36x3	Opt.	.....
Atlantic, 1C	.....	2,000	Opt.	5'	8'-6"	12' 7"	103	34x3½	36x4	Exide, 44	.....
Atlantic, 2C	.....	4,000	Opt.	5'	10' 6"	14' 8"	115	34x4	36x3*	Exide, 44	.....
Atlantic, 3C	.....	7,000	Opt.	6'	12'	16' 2"	135	36x5	40x4*	Exide, 44	.....
Atlantic, 5C	.....	10,000	Opt.	6'	13'	17' 4"	144	36x6	40x5*	Exide, 44	.....
Bailey, E	.....	300	Open	1'11"	2'10"	11' 9"	106	33x4†	33x4†	Edison, 60	150
Bailey, E	.....	300	Delivery	3' 6"	3' 8"	11' 9"	106	33x4†	33x4†	Edison, 60	150
Baker, X	1,900	1,000	.....	.....	.....	10'11"	86	36x3	36x3	Opt.	112-150
Baker, O	2,300	2,000	.....	.....	.....	12' 7"	102	36x3½	36x3½	Opt.	140-225
Baker, U	2,800	4,000	.....	.....	.....	14' 3"	120	36x4	36x3*	Opt.	168-300
Baker, CC	3,500	7,000	.....	.....	.....	Opt.	137	36x6	38x4*	Opt.	224-375
Borland	.....	1,500	Open	3'9"	7' 6"	10'10"	93	34x4	34x4	Exide, 40	112
Borland	.....	1,500	Closed	3'9"	7' 6"	10'10"	93	34x4	34x4	Exide, 40	112
Buffalo, CCA	2,200	1,500	Opt.	4'4"	9'	13' 4"	102	36x3½	36x3½	Phila., 44	153
Buffalo, CCA	2,400	2,000	Opt.	4'4"	9'	13' 4"	102	36x3½	36x3½	Phila., 44	178.5
C. T. ½ Ton	1,640	1,000	Opt.	3'6"	6'	11' 6"	90	36x2½	36x3	Opt., 42	.....
C. T. 1 Ton	2,095	2,000	Opt.	4'	8' 6"	12' 9"	100	36x3½	36x4	Opt., 42	.....
C. T. 2 Ton	2,725	4,000	Opt.	4'2"	11'	15' 6"	116	36x5	36x3½*	Opt., 42	.....
C. T. 3½ Ton	3,530	7,000	Opt.	5'	12'	15'	115	36x3½*	36x4*	Opt., 42	.....
C. T. 5 Ton	3,935	10,000	Opt.	5'6"	15'	18'	132	36x4*	36x5*	Opt., 42	.....
Detroit, 2-3	.....	2,000	.....	.....	10'	14' 9"	108	36x3½	36x4	Edison, 60	225
Detroit, 4-4	.....	4,000	.....	.....	11'	16'	128	36x4	36x3½*	Edison, 60	300
Detroit, 7-2	.....	7,000	.....	.....	14'	19'	144	36x5	36x4*	Edison, 60	375
Fritchle	.....	1,000	.....	.....	.....	.....	88	34x4	34x4	Own, 32	160
G M. C., 1**	1,400	1,000	Opt.	Opt.	Opt.	14'	106	32x2½	32x3½	Opt., 44	.....
G. M. C., 2**	1,500	2,000	Opt.	Opt.	Opt.	15'	118	32x2½	32x4	Opt., 44	.....
G. M. C., 3**	1,700	3,000	Opt.	Opt.	Opt.	16' 6"	130	32x3	32x5	Opt., 44	.....
G. M. C., 4**	2,000	4,000	Opt.	Opt.	Opt.	17'10"	138	32x3	36x3*	Opt., 44	.....
G. M. C., 6**	2,300	6,000	Opt.	Opt.	Opt.	18'	150	32x3½	36x3½*	Opt., 44	.....
G. M. C., 8**	2,650	8,000	Opt.	Opt.	Opt.	14' 4"	156	32x4	36x4*	Opt., 44	.....
G. M. C., 10**	2,950	10,000	Opt.	Opt.	Opt.	20'10"	166	36x5	36x5*	Opt., 44	.....
G. M. C., 12**	3,200	12,000	Opt.	Opt.	Opt.	22'	174	36x5	36x6*	Opt., 44	.....
G. V	1,370	750	Panel	3'4"	4'10"	9'10"	76	32x2½	32x2½	Own, 44	102
G. V	1,700	1,000	Panel	3'5"	6'	10'11"	86¾	36x2½	36x2½	Own, 44	153
G. V	2,100	2,000	Opt.	4'	8'	12' 5"	102	36x3½	36x3½	Own, 44	204
G. V	2,600	4,000	Express	4'8"	10'	13'10"	111½	36x4	36x3*	Own, 44	255
G. V	3,250	7,000	Express	5'	11' 6"	15' 5½"	128½	36x6	36x3½*	Own, 44	331
G. V	3,700	10,000	Express	6'	13' 7"	17' 5"	139	36x7	36x5*	Own, 44	382
Urban, 10	.....	1,000	Opt.	3'6"	6'	10'10½"	86	36x3	36x3	Exide, 30	165
Urban, 20	.....	2,000	Opt.	4'	8' 6½"	13' 6"	110	36x3½	36x4	Exide, 44	165
Urban, 40	.....	4,000	Opt.	5' 8"	11'	16'1½"	116	36x4	36x3*	Exide, 44	192.5
Urban, 70	.....	7,000	Opt.	6'8"	12'4"	17' 5½"	130	36x5	40x4*	Exide, 44	275
Van Auken, A	900	1,000	Closed	3'5"	8'	9' 6¾"	80	28x2	28x2	Exide, 16	137
Victor	1,500	1,000	.....	4'2"	6'	10'	92	30x2½	30x2½	Gould, 32	.....
Walker, G	.....	1,000	Opt.	Opt.	Opt.	Opt.	121	34x3	36x3	Opt., 42	.....
Walker, F	.....	1,000	Opt.	Opt.	Opt.	Opt.	92	34x3	36x3	Opt., 42	.....
Walker, C	.....	2,000	Opt.	Opt.	Opt.	Opt.	Opt.	34x3½	40x3½	Opt., 42	.....
Walker, B	.....	3,000	Opt.	Opt.	Opt.	Opt.	Opt.	36x4	38x5	Opt., 42	.....
Walker, D	.....	5,000	Opt.	Opt.	Opt.	Opt.	Opt.	36x5	36x3½*	Opt., 44	.....
Walker, E	.....	7,000	Opt.	Opt.	Opt.	Opt.	Opt.	36x6	36x4*	Opt., 44	.....
Ward, EO	1,050	625	Opt.	3'3"	6'	Opt.	81	30x2½	32x3	Opt., 42	127
Wayd, ES	950	400	Opt.	.....	.....	.....	96	32x2½	32x2½	Own, 42	102
Ward, EA	1,450	1,250	Opt.	3'6"	7'	Opt.	90	32x3	34x3½	Opt., 42	153
Ward, EB	1,900	2,500	Opt.	4'	8'	Opt.	108	34x3½	36x5*	Opt., 42	204
Ward, EC	2,400	5,000	Opt.	Opt.	10'	Opt.	60	36x5	38x3½	Opt., 42	280
Ward, ED	2,950	10,000	Opt.	Opt.	12'	Opt.	63	38x3½*	40x5*	Opt., 42	357
Waverley, Wagon	.....	1,000	Opt.	3'7"	6' 1"	11'	90	34x2½	34x2½	Opt., 42	135
Waverley, 1-ton	.....	2,000	Opt.	3'8"	3' 8"	8' 6"	104	34x3½	34x3½	Opt., 42	189
Waverley, 2-ton	.....	4,000	Opt.	5'	11'	15' 6"	114	36x4	36x3*	Opt., 42	216
Waverley, 3½-ton	.....	7,000	Opt.	5'	12'	16' 6"	127	36x6	36x4*	Opt., 42	270
Waverley, 5-ton	.....	10,000	Opt.	6'6"	13'	17' 6"	136	36x7	36x5*	Opt., 42	324

*Dual **Many chassis of this type, but of different price and frame dimensions are offered. Long. shaft and worm, longitudinal shaft and worm gear. † Pneumatic

Explanation of Table of Electric Com-

IN the specifications of the electric commercial vehicles on the market for the coming year, shown on these pages, every chassis that the various concerns expect to market is listed. However, in the case of the G. M. C. each vehicle of given load capacity is made in a number of different chassis lengths. Those given are known as the chassis B. For example, the first chassis listed has a 106-inch wheelbase. There are five other cars with practically the same specifications except as regards wheelbase and frame dimension.

In the column under chassis price many vacancies will be seen. This is due to the fact that the prices vary with the battery selected. In the Walker, for example, the six chassis are offered with any make of battery and not until the battery make is known may a price be set. The wheelbase length on four models is optional and this also is a factor in determining the selling price.

The body styles are optional in almost every case, the makers of these vehicles offering chassis and building the bodies to suit the needs of the purchaser. Where body dimen-

SPECIFICATIONS OF ELECTRIC COMMERCIAL VEHICLES FOR 1914

Mileage per Charge, Full Load at High Speed	MOTOR Make	MOTOR Type	MOTOR Location	Drive from Motor to Rear Wheels	Control Location	Forward Speeds	SPRINGS Front	SPRINGS Rear	Steering Location
50	Westinghouse	Series	Front rear ax.	Par. shaft & her. g	Below wheel	4	½ Ell.	½ Ell.	Left
50	Westinghouse	Series	Front rear ax.	Par. shaft & her. g	Below wheel	4	½ Ell.	½ Ell.	Left
50	Westinghouse	Series	Front rear ax.	Par. shaft & her. g	Below wheel	4	½ Ell.	½ Ell.	Left
50	Westinghouse	Series	Front rear ax.	Par. shaft & her. g	Below wheel	4	½ Ell.	½ Ell.	Left
60–85	Optional	.....	Amidships	Long. shaft and bevel	Left of driver	4	½ Ell.	½ Ell.	.....
.....	Gen. Electric	Series	Rear	3 Chains	Left of driver	4	½ Ell.	½ Ell.	.....
.....	Gen. Electric	Series	Rear	3 Chains	Left of driver	4	½ Ell.	½ Ell.	.....
.....	Gen. Electric	Series	Rear	3 Chains	Left of driver	4	½ Ell.	½ Ell.	.....
.....	Gen. Electric	Series	Rear	3 Chains	Left of driver	4	½ Ell.	½ Ell.	.....
60–80	Gen. Electric	Series	Front rear ax.	3 Chains	On wheel	6	½ Ell.	Ell.	Left
60–80	Gen. Electric	Series	Front rear ax.	3 Chains	On wheel	6	½ Ell.	Ell.	Left
40–50	Gen. Electric	Series	Front rear ax.	3 Chains	Below wheel	5	½ Ell.	½ Ell.	Left
40–50	Gen. Electric	Series	Front rear ax.	3 Chains	Below wheel	5	½ Ell.	½ Ell.	Left
40–50	Gen. Electric	Series	Front rear ax.	3 Chains	Below wheel	5	½ Ell.	½ Ell.	Left
40–50	Gen. Electric	Series	Front rear ax.	3 Chains	Below wheel	5	½ Ell.	½ Ell.	Left
40	Gen. Electric	Series	Amidships	3 Chains	Left of driver	5	½ Ell.	Ell.	Left
40	Gen. Electric	Series	Amidships	3 Chains	Left of driver	5	½ Ell.	Ell.	Left
45	Gen. Electric	Series	Part rear ax.	Bevel and spur	Left of driver	5	½ Ell.	½ Ell.	Left
45	Gen. Electric	Series	Part rear ax.	Bevel and spur	Left of driver	5	½ Ell.	½ Ell.	Left
.....	Gen. Electric	Series	Front rear ax.	Long. shaft and worm	Below wheel	3	½ Ell.	½ Ell.	Left
.....	Gen. Electric	Series	On rear ax.	Internal gear	Below wheel	4	½ Ell.	½ Ell.	Left
.....	Gen. Electric	Series	On rear ax.	Internal gear	Below wheel	4	½ Ell.	½ Ell.	Left
.....	Gen. Electric	Series	Front rear ax.	Int. gear on 4 wheels	Below wheel	4	½ Ell.	½ Ell.	Left
.....	Gen. Electric	Series	Front rear ax.	Int. gear on 4 wheels	Below wheel	4	½ Ell.	½ Ell.	Left
50	Own	Series	Under front floor	Long. shaft and bevel	Below wheel	4	½ Ell.	½ Ell.	Left
50	Own	Series	Under front floor	Shaft and side chains	Below wheel	4	½ Ell.	½ Ell.	Left
.....	Own	Series	Under front floor	Shaft and side chains	Below wheel	4	½ Ell.	½ Ell.	Left
50–70	Own	.....	Amidships	Bevel	Under wheel	.....	Ell.	Ell.	.....
50	Gen. Electric	Series	Behind rear ax.	Shaft and side chains	Top of wheel	5	½ Ell.	½ Ell.	Left
45	Gen. Electric	Series	Behind rear ax.	Shaft and side chains	Top of wheel	5	½ Ell.	½ Ell.	Left
40	Gen. Electric	Series	Behind rear ax.	Shaft and side chains	Top of wheel	5	½ Ell.	½ Ell.	Left
40	Gen. Electric	Series	Behind rear ax.	Shaft and side chains	Top of wheel	5	½ Ell.	½ Ell.	Left
35	Gen. Electric	Series	Behind rear ax.	Shaft and side chains	Top of wheel	5	½ Ell.	½ Ell.	Left
32	Gen. Electric	Series	Behind rear ax.	Shaft and side chains	Top of wheel	5	½ Ell.	½ Ell.	Left
27	Gen. Electric	Series	Behind rear ax.	Shaft and side chains	Top of wheel	5	½ Ell.	½ Ell.	Left
25	Gen. Electric	Series	Behind rear ax.	Shaft and side chains	Top of wheel	5	½ Ell.	½ Ell.	Left
45	Gen. Electric	.....	Center of frame	3 Chains	Left on seat	4	½ Ell.	½ Ell.	Center
45	Gen. Electric	.....	Center of frame	3 Chains	Left on seat	4	½ Ell.	½ Ell.	Center
45	Gen. Electric	.....	Center of frame	3 Chains	Left on seat	4	½ Ell.	½ Ell.	Center
45	Gen. Electric	.....	Center of frame	3 Chains	Left on seat	4	½ Ell.	½ Ell.	Center
40	Gen. Electric	.....	Center of frame	3 Chains	Left on seat	4	½ Ell.	½ Ell.	Center
45	Gen. Electric	.....	Center of frame	3 Chains	Left on seat	4	½ Ell.	½ Ell.	Center
45–50	Gen. Electric	Ser.-Par.	Front rear ax.	3 Chains	Below wheel	4	½ Ell.	½ Ell.	Left
40–45	Gen. Electric	Ser.-Par.	Front rear ax.	3 Chains	Below wheel	4	½ Ell.	½ Ell.	Left
40–45	Gen. Electric	Ser.-Par.	Front rear ax.	3 Chains	Below wheel	4	½ Ell.	½ Ell.	Left
35–40	Gen. Electric	Ser.-Par.	Front rear ax.	3 Chains	Below wheel	4	½ Ell.	½ Ell.	Left
45	Gen. Electric	Series	Front rear ax.	Shaft with spur	Left of driver	4	½ Ell.	½ Ell.	Left
40–50	Westinghouse	Series	Front rear ax.	Shaft with bevel	Left of driver	4	Ell.	Ell.	.....
.....	Westinghouse	Series	Part rear ax.	Int. gear in rear wheels	Left of driver	5	½ Ell.	Plat.	Left
.....	Westinghouse	Series	Part rear ax.	Int. gear in rear wheels	Left of driver	5	R Ell.	½ Plat.	Left
.....	Westinghouse	Series	Part rear ax.	Int. gear in rear wheels	Left of driver	5	R Ell.	½ Plat.	Left
.....	Westinghouse	Series	Part rear ax.	Int. gear in rear wheels	Left of driver	5	R Ell.	½ Plat.	Left
.....	Westinghouse	Series	Part rear ax.	Int. gear in rear wheels	Left of driver	6	½ Ell.	½ Plat.	Left
.....	Westinghouse	Series	Part rear ax.	Int. gear in rear wheels	Left of driver	6	½ Ell.	½ Plat.	Left
50–75	Gen. Electric	Series	Front rear ax.	3 Chains	Left of driver	4	½ Ell.	½ Ell.	Left
50	Westinghouse	Series	Amidships	Long. shaft and bevel	Left of driver	4	½ Ell.	Ell	Left
45–60	Optional	Series	Front rear ax.	3 Chains	Left of driver	4	½ Ell.	½ Ell.	Left
40–50	Optional	Series	Front rear ax.	3 Chains	Left of driver	4	½ Ell.	½ Ell.	Left
35–45	Optional	Series	Front rear ax.	3 Chains	Left of driver	4	½ Ell.	½ Ell.	Left
30–35	Optional	Series	Front rear ax.	3 Chains	Left of driver	4	½ Ell.	½ Ell.	Left
50	Own	Series	Front rear ax.	Chain, shaft & her. g	Left of driver	4	Ell.	Ell.	Left
45	Optional	Series	Behind rear ax.	Bevel and side chains	Left of driver	4	½ Ell.	½ Ell.	Left
35	Optional	Series	Behind rear ax.	Bevel and side chains	Left of driver	4	½ Ell.	½ Ell.	Left
35	Gen. Electric	Series	Behind rear ax.	Bevel and side chains	Left of driver	4	½ Ell.	½ Ell.	Left
30	Gen. Electric	Series	Behind rear ax.	Bevel and side chains	Left of driver	4	½ Ell.	½ Ell.	Left

R—Reverse Elliptic ½ Ell., Half elliptic Ell., elliptic Ser. Par., Series parallel Par. shaft & her. g. shaft parallel with rear axle and herringbone gear. Long. shaft and bevel, longitudinal shaft and bevel gear.

mercial Vehicle Specifications for 1914

sions are given and the body style is optional, the body dimensions are confined to these measurements. This is not the case in every instance, however.

Although certain makes of battery are given, the purchaser has the liberty of choosing another make, which in some cases is at extra cost and in others without extra cost. The number of cells also may be increased or decreased, this depending upon the kind of work the car will do.

On account of the optional battery equipment, the ampere-hour capacity cannot be stated. The mileage per charge is obtainable, however, and is shown in most cases where the number of battery cells is given.

Where the drive to the rear wheels from the motor is given as 3 chains it means that the motor drives a countershaft by chain and the side chains operate the rear wheels. In the case of the Walker, the motor is part of the rear axle. This method of drive eliminates a long drive shaft or side chains.

batteries are being charged in a garage, this cutout removes all possibility of the truck being started and further permits of mechanics working on the controller.

The carrying of the wiring in metal conduits, thus protecting it from water, acid or mechanical injury, and at the same time eliminating the possibility of grounding due to an injured wire, is another improvement that adds the facility of replacing any damaged wiring without the necessity of removing the body or any other part of the vehicle.

Improvements also are noted on the lamp circuits, cartridge fuses having replaced open fuses. The cartridge fuses are safer from a fire standpoint and can be replaced by the mechanic easily and without danger. Moreover, the new models are fitted with a plug receptacle for the portable or trouble lamp, thus enabling the garage mechanic to connect the trouble lamp quickly and without having to use the head or tail lights as formerly.

As regards the chassis, the increase in the number of grease cups on the spring shackle bolts is the most notable improvement and one that should add 100 per cent extra wear to the spring eyes and bolts.

From the driver's viewpoint, the equipment of these vehicles with an emergency brake is most appreciated. Especially on the heavier capacity machines this will be an added safeguard when coasting down severe grades and should tend to discourage the practice of some operators who use the controller of the brake, which often results in damaging the controller as well as the motor and battery.

For the convenience of the driver, a tool box of sheet steel has been added. It is mounted under the rear of the chassis, where it is accessible to the operator without making it necessary for him to interfere with any other part of the car.

With the exception of the chassis changes as enumerated above, the chain-driven vehicles of this company are continued practically as in 1913. Their battery equipment is the same; their load capacities have not been changed; their rated speeds are as at present; and the general scheme of design has not been altered. Finer workmanship and many new chassis details, as well as wiring improvements, will add appreciably to the mileage radius per battery charge.

OHIO

THE Ohio Electric Car Co. of Toledo, O., at the present time is unable to furnish details of its commercial line for 1914, and hence does not appear in the specification table of this issue.

URBAN

WITH battery equipment, chassis details and driving method unchanged, four models of Urban vehicles, with capacities of 1,000, 2,000, 4,000 and 7,000 pounds as in 1913, will be the 1914 offering of the Kentucky Wagon Mfg. Co. of Louisville, Ky.

Although a few changes have been made for 1914, the Urban vehicles still are characterized by pressed steel frames that are used throughout and drive from the motor to the countershaft by silent chain and from the countershaft to the rear wheels by roller chain. As usual with jackshaft construction, the service brakes are contracting types and located on the ends of the shaft, while the emergency brakes are internal expanding and operate within their rear wheel drive.

The batteries, which are mounted beneath the frame, have a tray which is covered on top with a metal cap. This is provided with a capped vent hole making it waterproof, an important consideration in battery mounting. Between the battery and this metal cap is an insulating bore and the sides and bottom of the tray are of wood to prevent the possibility of battery grounding. Battery accessibility is furnished by having the side of the tray in the form of a door which, when swung outward and down and supported by folding braces, permits the battery parts to slide out on greased metal strips. Openings between the floor boards are provided for battery regulation. These openings can be closed readily in cold weather by inserting wool filling strips provided for the purpose.

A lead battery equipment, giving a mileage of from 35 to 40 miles on the 7,000-pound vehicle, 40 to 45 miles on the 2,000 and 4,000-pound types and 45 to 50 miles on the 1,000-pound model, is listed. Thirteen plate cells are used in the 1,000 and 2,000-pound trucks, fifteen for the 4,000-pound machine and twenty-one for the 7,000-pound wagon.

Chassis constructions have been standardized by this company, which uses S. A. E. wheel sizes in its tire equipment. Semi-elliptic springs are regularly used, all road wheels are carried on roller bearings and ball bearings are used for the motor and jackshaft. Throughout the chassis careful attention has been given to all parts.

VAN AUKEN

THE Van Auken delivery wagons, one with a load capacity of 750-pounds and the other rated as a 1,000-pound vehicle, are debutantes of the 1914 season. They are products of the Van Auken Electric Car Co. of Connersville, Ind. The lighter vehicle is a closed type, while the heavier wagon is an open one. Each lists at $1,000.

Shaft drive and worm reduction at the axle are conspicuous features of design of both models, which are alike in general chassis construction. A Hycap Exide battery, divided into two trays of eight cells each, is located under the channel steel framework, part of the battery being carried under the front of the car and part under the rear. The battery is listed with a 45-mile radius per charge at a speed of 12 miles per hour on fourth or high forward speed.

Each of the vehicles has a wheelbase of 80 inches, carry 2-inch solid tires and are designed to turn in a circle with a diameter of 30 feet 6 inches, making unnecessary the use of the reverse in maneuvering on the street. There is but one set of mechanical brakes, a service set of external bands acting on the rear wheel drums.

WALKER

WITH the possible exception of weight variations of 500 pounds in some models, the 1913 line of the Walker Vehicle Co. of Chicago will be continued for 1914. The capacities for next year are 1,000, 2,000, 3,000, 5,000 and 7,000 pounds. All five models use the Walker drive, that in which the electric motor is incorporated within the rear axle housing and drives to both rear wheels through the Walker balanced drive system, a feature of design that has been used since the entrance of the company into the electric vehicle field.

On all vehicles an option of Edison or lead batteries is given with the capacity a trifle large in the lead types, two cells being added in most of the models thus equipped. The company lists an optional ampere-hour capacity, determined by the service the truck has to meet, and gives a 4-year guarantee with the Edison battery equipment.

Two sets of mechanical brakes are used on all models, the service brakes being external types on the rear axle and the emergencies internal types on the same drums.

The front spring suspension is a transverse reverse elliptic type, most familiarly known as the X type, mounted crosswise over the axle. Pressed steel road wheels are used on both front and rear.

WARD

LACKING in innovations and selling at practically the same prices as this year, the Ward truck, product of the Ward Motor Vehicle Co., of New York, makes its 1914 debut in five capacities—500, 1,000, 2,000, 4,000 and 8,000-pound models, all of which have been on the market this season.

Only one change is noted in the line, and that is the adoption of larger tires. The 1-ton model, which was equipped with 34 by 4-inch tires all around, this year carries 34 by 4 in front and 36 by 5 in the rear this coming season. Another example of tire size increase is that of the 2-ton vehicle, which has 36 by 4 front and 36 by 3 dual rear this year, but will be equipped with 36 by 5 front and 36 by 3½ dual rear for 1914.

Practically the same battery equipment, braking system and running gear details as in use this year will be continued in 1914, and all the new models will follow the 1913 chassis design, marked by the use of a single motor mounted transversely under the frame and at the rear of the battery.

The drive is by silent chain to the countershaft, which is mounted on self-aligning annular ball bearings, and thence by side chaining to the wheels. Timken axles are used.

Ward vehicles are listed with a wide range of battery equipment, including Ward-Philadelphia, Ward-Willard, Ironclad-Exide and Edison, the battery equipment in capacity being adapted to the truck work and its zone of operations. With lead equipment forty-two cells are used, the number of plates varying according to the models—that is, the 500-pound vehicle carries eleven plates; the 1,000-pound, thirteen; the 2,000-pound, seventeen; the 4,000-pound, twenty-three, and the 8,000-pound, twenty-nine.

The company assembles the parts of two of the batteries offered to meet its own requirements, as the use of the name Ward in connection with two of the options signifies.

WAVERLEY

WITH frame, spring suspension, control, electrical units and wiring standardized, five new models are listed for 1914 by the Waverley Co. of Indianapolis, Ind. The capacities of this electrical quintet range from 1,000 to 10,000 pounds, the intermediate capacities being 2,000, 4,000 and 7,000 pounds.

As this year, the battery is underslung amidships but the mounting has been improved by the allowance of an extra amount of space between the battery trays which makes for greater free air circulation. For the sake of greater accessibility, the battery is mounted in smaller tray units than formerly.

The five chassis are similar, all being chain-driven with the exception of the 1,000-pound model, which is shaft-driven, with the motor mounted immediately in advance of the axle and the propeller shaft parallel and in front of the axle, a method of drive used on Waverley vehicles for years. Between the motor and propeller shaft is a silent-chain reduction and between the propeller shaft and the differential is a herringbone gear reduction. On all other models the motor transmits to a jackshaft, either by gear direct or by short propeller shaft. Transmission from the jackshaft to the rear wheels is by roller chain.

The Waverley chassis are well equipped with grease cups, which are fitted to all working parts—on spring bolts, brake shaft bearings, front axle pivots, cross rod and steering link connections and rear axle at the brake shaft bearings. The use of a thin medium grease is recommended.

Each vehicle carries two sets of mechanical brakes which are mounted on the jackshaft and rear wheels with the exception of the 1,000-pound model which carries all brakes on the rear wheels.

Either lead or Edison cells are listed, the former in forty-two cell groups and the latter in sixty-cell units. With lead cells, the number of plates varies with the capacity increase. With Edison batteries, the cells used are A-4, A-6, A-8, A-10 and A-12.

Improvements Made in Public Electric Garages

Better Service Given the Car Owner

Methods of Charging the Car Batteries

WITH the comparatively large increase in the use of the pleasure electric within the last 3 or 4 years, there has been a proportionate rise in the number of public garages for such vehicles, and the chief improvement has been made by specialization. Two years ago innumerable garages for gasoline cars could be seen, and each equipped with some means of charging the batteries of the electric vehicle, but the methods of caring for the car were not as they should be.

Specialization a Factor

There were few specialists in electric vehicles 3 or 4 years ago, because there were comparatively few electrics in use, but today there are so many such vehicles on the streets, and their number increasing so fast that many men have given their entire energy to the care and repair of electric pleasure cars. And the cars are deserving of such care just as the gasoline motor is worthy of the attention it receives.

Aside from specialization, the next most important step has been directed toward service to the owner. The electric garages of today give so much more for a given monthly payment than did the garages of a few years ago that one no longer wonders why the number of cars has increased so rapidly. In many cities for $35 a month the car is called for and delivered, the battery is charged, the parts of the vehicles oiled, the body is cleaned; in fact, everything is done for the owner that is necessary, and all he need do is drive the car.

In the early life of the electric such service was not to be had at the low rate quoted, due to the fact that specialization was lacking. Today there are three times as many garages taking care of electric vehicles alone, as there were 3 years ago. The price of service has risen slightly, but out of all proportion to the service rendered, which is now at a point where little more may be added.

Improvements in the garage system is another point for consideration. Three years ago one could not see the routine work which he sees in the electric garage of today. A car is sent for by the garage and the driver brings it to the building. Before taking its place on the floor, an inspector looks over the running gear and body; in fact, everything but the batteries. If anything is essentially wrong, the owner is notified and asked whether the work shall be done. If the work is taken in by the service, then the owner is not notified. Such inspectors were not to be seen in the electric garage even 2 years ago.

One man charges the batteries and flushes them with water and another man usually supervises his work and sees that the battery is in good condition at all times. Is it any wonder that the electric vehicle is gaining in number? In the garage of the past if a car on charge should accidentally start rolling down the graded floor it would tear the charging cable from its socket, as one end was usually fastened permanently. This has been remedied by making both ends of the charging cable removable and by placing a universal at the plug end so that no matter which way the car starts rolling it means only that the cable will drop to the floor.

The open wiring of previous years has been done away with largely, and now one may see the wires in concrete conduits integral with a concrete floor. The cars are arranged in rows, in some instances as many as twenty-five in a row, with an aisle 5 to 10 feet wide between each row. All that is visible when the cars are on charge is one cable leading to each set of batteries. In one Chicago electric garage as many as eighty cars are charged at once.

Initial Current Now Direct

In the more modern building the initial current is direct, doing away with rectifiers and all its necessary complications. Working in unison with the power companies, the garages are aiming to having special direct current lines laid in districts where only alternating current is available at the present time.

More garages are charging batteries by the gravity method than ever before. This condition is due primarily to the alleged inaccuracy of the meter method. Now may be seen a gravity-taker making the rounds, and when the electrolyte of the batteries has reached a certain figure, 1.28 in most instances, the car is taken off charge. Some garages still practice charging by taking meter readings, which is a good method but requires more watchfulness than the gravity method.

The charging limits are such now that as low a rate as 1 ampere may be sent to the batteries, this being accomplished by the use of sensitive rheostats. The carbon rheostat has come in, and it appears will gradually displace the wire type.

Another improvement in public garages is to be seen in the use of water distillers. Heretofore the garage owner was dependent upon some distilled-water concern for his supply of pure water for battery flushing, but with his own plant he is able to make his hydrant water pure. This is being done not because there is a monetary saving affected but to make certain that only pure water is used for the batteries.

Facilities for Rebuilding

The modern public garage is able to rebuild an electric, having facilities for building and repairing bodies, making new upholstery, repairing every part of the electric vehicle and painting the rebuilt car. Such facilities were lacking in most of the garages of former days.

Reception rooms for women viistors is another innovation which the old-time public garage did not have and the beauty of these rooms is something to be admired.

One of the best examples of a modern, exclusive electric garage may be seen in the Fashion Automobile Station, Chicago, a one-story building of 36,000 square feet at Cottage Grove avenue and Fifty-first street, devoted entirely to the storage, care and repair of electrics. Every possible improvement up to the time of its construction a few months ago has been put into practice. Even the lighting at night is such as to prevent shadows so that the men cleaning the cars may do their work better. This is but one example; there are many such electric garages.

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Electric Progress

THE past 6 months have been months of activity with engineers of electric passenger and commercial vehicles, months in which the varied problems of battery economy have been analyzed, because in its final analysis the battery is the limiting factor of the electric vehicle. The electric vehicle maker has a problem ahead of him not unlike that which confronted the gasoline engineer a few years ago, in those days when more horsepower was needed and to get more horsepower there seemed no other way than to make the motor larger, add to the cylinder bore and stroke or add a couple more cylinders. With gasoline engineers this proved a costly program in that bigger cylinders meant higher gasoline consumption and more pounds of motor weight to carry around and so consume a portion of the added motor power.

THEN came a change. The long lane had its turninig. Instead of adding power by bigger cylinders the engineer learned that power could be added by changing features of design on the motor. Heavier crankshafts greatly reduced vibration and resulted in an increase of horsepower delivered to the rear wheels without adding to the cylinder sizes or fuel consumption. Improving the crankshaft bearings brought its results. Valve timing and diameter had their hearing on increased power output. The improved lubrication system of the motor added its quota. Refined ignition systems did their part. A better ratio of piston stroke to cylinder diameter is now being evolved. So through the entire gamut of the gasoline engine, the refinement program has progressed, each change adding power and adding to the sum total efficiency of the car.

WHAT the gasoline engineer has done, and is doing, the electrical engineer has been and today is busy upon. He is working along the line of more battery capacity obtained through the elimination of those friction losses that consume electric current just as surely as ton-mileage of useful loads. The electrical engineer has a varied and interesting program before him. He has cut down friction losses in the running gear by using better bearings in the road wheels and rear axle. He points to these as 1914 improvements. Not only has he used better bearings but has fitted better washers and caps to keep the lubricant in these bearings and keep the dust and dirt out.

BUT the electrical engineer has gone farther. In many cases he has quite re-vamped the electrical characteristics of his motor so as to get a better torque, one to give quicker acceleration and better performance on hills. Some have introduced lower-speed motors in order to get greater quietness and longer wear of the brushes and commutator. Direct drive from the motor to the rear axle is resulting in battery economy, and improved bearing surfaces in the universal joints of the propeller shaft are doing their part to add to the mileage per charge of the battery.

WE can go farther in this elimination of friction, but it is needless. It is sufficient to show that scarcely a stone is being left unturned in this campaign to increase battery mileage by improving the mechanical parts of the car, its running gear and power transmission system.

THEN there is a positive aspect to this battery mileage increase per charge. First, batteries are better, and in some instances have been made lighter while being improved. To do this the thin-plate cell has been introduced, so that instead of eleven plates in a cell there now are thirteen and the cell made no larger. The thin-plate cell gives a higher voltage for hills and acceleraiton, and has been so designed that its life is as great as that of the thicker-plate style which it is displacing.

HAND in hand with thinner plates is that of a more efficient filling material on these plates. The chemical composition of it has been altered, and its adhesive and cohesive qualities added to so that disintegration is slower and the plate's life consequently longer. All meaning a greater mileage radius per charge.

BUT the electrical engineer has followed out other avenues of power economy or, more accurately, electric current economy. His wiring has been improved. Larger-section wire is used, meaning less drop in voltage and higher current conservation. Wiring has generally been reduced in length, by more compactly grouping the battery, motor and controller. This shortening prevents voltage drop, and by better incasing the wires in conduits a still farther percentage factor in efficiency is obtained.

ONE more positive factor in adding to battery mileage is that battery trays now are so mounted, in nearly every car, as to leave every cell accessible for inspection, filling with water and testing by simply raising the front or rear hood. This accessibility is certain to work in the interests of sustained mileage per battery charge, if not accomplishing any positive good so far as the mileage per charge at time of delivering the car to the owner.

MANY other aspects of electric car improvement have been made. Dual control has become an accepted factor and many improvements have been made with it. Its use will largely be confined to five-passenger vehicles in which all the passengers face forward. The popular solution of dual control is to equip with two entirely separate control units, one for the front seat, the other for the rear seat. One maker has by a simple adaptation of universal joints made one set of steering and controlling parts suffice. The eventual solution of dual control undoubtedly will be determined by production factors. The electric has just reached the threshold of production in quantities and lower prices, and as this movement gains headway it will be imperative to adopt those constructions that giving satisfactory results are also the cheapest.

ELECTRIC vehicles for passenger or pleasure use are a little more roomy than formerly. Inside measurements of the inclosed cars—the coupes, broughams and other coach-type vehicles—show 4 or 5 inches more space between front and rear panels. This space is made necessary by the adoption of the all-face-forward idea in so many of the new cars, in order to give knee-room for the revolving types of front seat. Designers of electrics have taken another leaf from gasoline body building in the adoption of the sashless window which was introduced in the latter field some 3 years ago. It is a desirable safety factor in these days of increased traffic.

U. S. India Rubber Imports for 1913 Break All Records

Largest in the History of the World

WASHINGTON, D. C., Oct. 18—It will be interesting to the tire trade to learn that India rubber imports into the United States in the fiscal year 1913 were the largest in the history of the import trade. They amounted, in crude rubber, to 113,000,000 pounds, against 110,000,000 pounds in the former high record year, 1912, this being the third time in which the imports of this article exceeded 100,000,000 pounds in a fiscal year.

These figures apparently sustain the frequently published assertion that the United States consumes half the rubber of the world, since the world's production of india rubber, was according to an authority, in 1912, 100,000 tons, or 224,000,000 pounds, while our own imports in the year ended June 30, 1913, were 113,384,359 pounds.

The growth in the use of rubber in the United States is illustrated by government statistics, which show importations of india rubber in 1890 of 34,000,000 pounds; in 1900, 49,000,000 pounds; in 1910, 101,000,000 pounds, and in 1913, 113,384,359 pounds.

The world's production of rubber, according to the authority above mentioned, was, in 1905, 61,000 tons; in 1910, 70,000 tons and in 1912, 100,000 tons, while the estimate for 1913 is 115,000 tons. The rapid increase in the share of the world's rubber, which is obtained from cultivated trees, is illustrated by the fact that in 1905 less than 1 per cent of the world's rubber was obtained from plantations, the remainder being from natural forests, while in 1912, 27½ per cent was obtained from plantations. The estimate for 1913 allots 40 per cent of the production to plantations, the quantity of cultivated rubber having grown from 145 tons, in 1905, to 8,200 tons in 1910, 27,500 tons in 1912 and an estimate of 45,000 tons in 1913.

Brazil still supplies more of the india rubber imported into the United States than any other country, but the percentage of the imports supplied by Brazil is now materially less than a decade ago. The share of the crude rubber imports drawn from Brazil was 56.6 per cent in 1903 and 38.4 per cent in 1913, while the share drawn from the United Kingdom in whose colonies are found most of the rubber plantations was, 17.7 per cent in 1903 and 30.1 per cent in 1913. The quantity of india rubber drawn from the East Indies is also rapidly increasing, having been, in 1903, less than half a million pounds and in 1913 more than 12,000,000 pounds. The prices of that arriving from the sections of the world in which most of the plantation rubber is now produced are now materially higher than that from the chief source of the natural supply—Brazil in South America.

The average import price of the rubber drawn from the United Kingdom in 1913 was 98.3 cents per pound; that from the East Indies, 97.3 cents and that from Brazil, 59.5 cents; the average import price per pound of the entire importations of india rubber in 1913 having been 79 cents, against 84 cents in 1912 and $1.06 in 1911, the high record year in the import price of india rubber.

The 113,000,000 pounds of crude rubber imported into the United States in 1913 is, by no means, the entire supply of material of this character brought from abroad. The year's importations of india rubber and "substitutes for" include, besides, the 113,000,000 pounds of crude rubber, 45,000,000 pounds of gutta joolatong, 10,000,000 pounds of guayule gum, over 1,000,000 pounds of balata, nearly 50,000 pounds of gutta percha and 43,000,000 pounds of rubber scrap or refuse fit only for remanufacture. The 45,000,000 pounds of gutta joolatong and 10,000,000 pounds of guayule gum, both of which serve in a limited way as substitutes for rubber, are much lower in price, the average import price of gutta joolatong being about 5 cents per pound and of guayule gum, 42.5 cents. The scrap rubber, which consists chiefly of old rubber shoes, boots, belting and motor car tires, amounted to 43,000,000 pounds in 1913, against 26,000,000 pounds in 1912, averaging about 8 cents per pound, and coming chiefly from Russia, Germany, England and Canada.

The Electric Industry for 1914

(*Continued from Page 7*)

the other. There are approximately the same number of concerns building electric commercials as build electric pleasure, and while statisticians have estimated the 1913 output of electrics at slightly over 3,300, the output for 1914 is put beyond 4,600, showing approximately a 30 per cent increase.

Few makers have added to the number of models listed this year, and where additions have been made they have generally come in the 1,000-pound type of vehicle. Two or three new ones have been added in this class, and they generally are of the worm or bevel-driven types.

In the chassis pressed-steel frame constructions are becoming more general, and these in nearly every case are of the bottle-neck pattern, narrowed in front, making it possible to maneuver the vehicle in closer quarters. It consumes electric current in reversing two or three times to turn in a narrow street, and if frame improvements of this nature eliminates such maneuvering then the battery is being proportionately conserved.

Looking more particularly at the battery, there has been a general increase in capacity by using more cells and more plates per cell, and where Edison types are used, also increasing the number of plates. When a variety of models are listed the number of cells used has generally been standardized, but the number of plates per cell increased in proportion to the requirements, some using eleven plates, others fifteen, some seventeen, and larger models still higher. The same story is true of Edison types.

Battery economy is noted in the new chassis designs which are brought out, in which the motor is placed in rear of the front axle and the battery carried in right and left trays at either side, leaving space between them for the driveshaft from the motor to the rear axle or packshaft. Such a grouping of battery, motor and controller greatly reduces the wiring length and cuts down voltage drop. Added to this is the better protection of the wires in conduits, an improvement which is quite general as compared with one year ago.

There is a more general use of larger tires, and the electric solid tire is in greater evidence than ever before. This tire has a greater resilience factor than the solid type used on gasoline machines, but a slightly reduced tire mileage, the tire being a compromise in order to give best total results of battery mileage and tire mileage. Tires are also larger in size. For example, for 32 by 3-inch sizes have been substituted 34 by 3½ tires.

Shaft drive is making its appearance in real earnest in the smaller types, those from 2,000 pounds and under, and it will not be surprising to see it invading the higher capacity field within a year.

Accessibility has received considerable attention, particularly in new models. One of the tendencies in this respect is that of using a small forward bonnet or hood under which are carried the controller, electrical instruments and lamps. Such a location takes up little additional floor space and gives these parts that accessibility which they merit.

In batteries the accessibility is largely confined to mounting the cells in trays of convenient size for quick removal. To add to this accessibility the doors of the battery compartment are frequently made to swing outward and downward so as to form a horizontal platform on which the trays can be withdrawn. To facilitate this work the trays are mounted on rollers.

Paris Salon Opens With 900 Exhibitors

Cadillac, Hudson, Packard, Studebaker, Overland, Buick, Mitchell, Ford, and Case Among American Makers Showing

By W. F. Bradley

PARIS, Oct. 17—Special cablegram—Favored by the patronage of President Poincaré and the fashion center of all Paris, the fourteenth annual Paris salon opened in the Grand Palais today with 898 exhibitors, twelve more by actual count than displayed cars and accessories at the French motor show of a year ago.

As 830 of the 898 exhibitors are French makers, it is very evident that the salon of this year is not as international in character as the Olympia show, to be held in London next month, promises to be. America leads the foreign contigent with twenty-four exhibits including such cars as the Cadillac, Hudson, Packard, Studebaker, Overland, Buick, Mitchell, Hupmobile, Ford, Case and Benjamin Briscoe's new product, brought out here, and such accessories as the Stewart speedometer, Vacuum oil, Warner speedometer, Bowser tanks and Oildag.

Next to America, England, with twenty-three exhibits, lends the most international flavor to the salon. Then comes Italy and Germany with eight exhibits each and Belgium with five, a total of sixty-eight foreign displays.

Status of Six-Cylinder

The six-cylinder model, now in its ascendency in America, is not popular with the French makers, if the exhibits at the salon are any criterion. In fact, the small six has not made the showing expected of it, only one French builder, Delaunay-Belleville, paying any attention to it. The four predominates. Its characteristics are a block motor with L-type cylinders and a stroke slightly longer than this year's, although the stroke-bore ratio does not average any higher than for 1913.

The Knight motor, adopted by Panhard, Clement, Mors, Gregoire and other French makers as well as by representatives from other countries, continues in force but with the exception of the Knight, the non-poppets have gone back and are not in as much evidence as they were a year ago.

Novelty row always features the Paris salon and this year's novelty is electric lighting which monopolizes the spotlight. Electric lighting has made a startling conquest and the French makers are enthusiastic about it. The self-starter, though found on some cars and listed as extra equipment, has not made as triumphant invasion as electric lighting.

The 133 chassis on exhibition at the various booths show that much attention has been given to refinements of springs and brakes as well as motor compactness and reliability. The cyclecar movement has exerted its force and exemplifies itself in a tendency towards small four-cylinder motors.

POSTER FOR THE PARIS SALON

From an American viewpoint the new car of Benjamin Briscoe is of interest. It is a five-passenger model which will probably be listed at $900, and to this is a four-cylinder cyclecar selling complete at $390. It is understood that arrangements have been completed for building these for the European market as well as for the construction in America. The new touring car is a four-cylinder unit construction, cylinder 3.1 by 5.1, L-type, with inclosed valves. Lubrication is by circulating system; there is a three-speed gearset, and two two sets of rear wheel brakes. The wheelbase measures 105 inches and the weight is 980 pounds. The body is a five-passenger European type without a break from bonnet to rear.

Of greatest interest in the large cars of European makers is that of the streamline body styles and the pure boat types, the latter built up on ribs.

Expenditure on the show doubtless will exceed the sum of $200,000. The joint committee responsible for the show has the advantage of securing the use of the finest exhibition hall in the world at practically no other cost than indemnities to a few small bodies having been ousted to make room for the motor show. Stands are furnished to the exhibitors completely fitted up and decorated, the cost of the best and largest places being $4,000. Under the new method of management, exhibitors are entitled to share in the profits. Last year the exhibiting firms having a membership in one of the trade organizations responsible for the salon were refunded 35 per cent on their stand rental, and non-members 16 per cent. The president of the joint committee running the show is Louis Renault. The general manager of the exhibition, is in the hands of Henri Cezanne, who had charge last year.

Uniform Decorations Prevail

There are numerous innovations in this year's show. After living through a period of lavish display, when even the adjoining streets were included in the sumptuous decorative scheme, there was a short period during which an attempt was made to abolish shows. This was followed by an experiment with shows every 2 years, and has been succeeded by the present decision to hold an annual show of an artistic nature but on sound business

lines with no attempt to bring the crowds in by world's fair methods.

Instead of crowding the hall to suffocation on the first day by the very simple expedient of distributing free tickets, not a pass was given out today. Instead, the price which is normally 20 cents, was increased to $1, thus making sure that only those persons really interested in motor cars would be brought into the hall. Next Friday the price will be increased to 60 cents, and on Monday, October 27, the last day of the exhibition, the late comers will have to pay $1 to pass the turnstiles. There now is no necessity to seek to stagger the crowds by thousands of lights and a wealth of decorative matter. The masses are converted to the motor car and the problem now is to get in the greatest number who are purchasers or likely to become immediate purchasers.

Early Date Better

The change of date from December to October also has been made from economic reasons. After the summer season there is a slackening off at the factories and full work is not taken up until the show has come to a close. Thus the earlier the show can be held the shorter the slack period in the shops. While this change will make for internal economy, it has the additional advantage of making Paris the first show of the season and therefore attracting dealers, and particularly foreign dealers, who would otherwise visit the London exhibition.

The Paris show is not as international as the one at London, but under every other heading it has a decided advantage over its rival. It is an absolutely complete representation of the continental motor industry, the only European country which is not fully represented being England, it has a natural setting which no other city can hope to rival; and it has the advantage of being very easily reached from all parts of the continent.

American firms are more numerous than last year and, it is worthy of note they are not the same as last year. The Hudson Motor Car Co. occupies stand No. 1, a choice position directly opposite the main entrance. This is ample proof that a foreign firm can receive generous treatment at the hands of the Paris show committee. A turn of the wheel gave Hudson this position, but the system under which lots are drawn is such that there is very little difference shown between home and foreign firms. The other American firms taking part in the exhibition are Abbott (Rushmore lamps), Bowser Co., Benjamin Briscoe, Buick, Cadillac, Case, Ford, Hupmobile, Mitchell, Oildag, Overland, Packard, Stewart, Studebaker, Vacuum Oil Co., Warner.

The Grand Palais is this year too small to hold the exhibits. This is not due to the increased number of exhibitors, for the figures only are about a dozen higher than last year, but to the fact that firms have asked for bigger stands than ever before. The amount of space rented in the main hall is 252,000 square feet. In order to provide for commercial vehicles, a special building has had to be erected on the banks of the Seine, about 50 yards from the Palais. Permission to erect this temporary building was not granted until very late, but within 5 days of the order being given a stout wood building with big glass windows had been put up and roofed. The number of exhibitors in the commercial vehicle section is twenty-three, occupying 9,700 square feet of space.

Refinement is the order of the day in the general appearance of motor cars as shown at the Paris salon. It is now impossible to sell a car, whether it be a 6-horsepower runabout or a powerful touring model, with an abrupt break at the dashboard and discontinuity in its lines. The most conservative manufacturers, who have clung to their own particular type of bonnet and dashboard as if they were family heirlooms, have had to give way before this modern movement, and so dispose their bonnets that they will harmonize with the body to be put behind them.

Delaunay-Belleville is a good example of this. The radiator is distinctive; it is round, and naturally suggests an engine boiler, on the manufacture of which this firm's reputation was made before it secured success in the motor field. Now the bonnet has been modified, the gasoline tank has been placed behind it, there is no break between bonnet and tank, and it is possible for the coachbuilder to so lay out his work that there will be no break between tank and body.

After making the bonnet so that it will harmonize with the body, car manufacturers have gone a step further and have made their radiators harmonize with the whole. The tendency is towards gentle curves: everything is rounded off; there is no abrupt break anywhere; even the mudguards are domed, everything is being cleared off the running boards and a visible door handle is an abomination. Yet at the front end of the car there was a sharp break from the flat radiator to the gently sloping bonnet. This harsh effect has been got over by rounding off the top and the sides of the radiator, so that the car begins sweetly, and not with a sudden jerk shocking to the eyes.

Change in Radiator Styles

Peugeot appears to have been the first to adopt this, but others were not long in following. It is only a detail, but it is remarkable what an effect it has in softening the lines of the car. Other makers have not only rounded off the angles but have made the radiator more or less pointed. Carried to extremes, a harsh effect is again obtained. It is a difficult matter to get a really good effect, and there are some makers who would have been well advised to leave their radiator flat and merely round off the angles. Panhard has adopted the slightly pointed radiator with very pleasing results. The pointed radiator has the additional advantage of slightly cooling the area of the cooling surface, and in these days of high-efficiency motors the extra area often is welcome. Metallurgique claims to have a patent on the pointed radiator and has threatened court proceedings; nobody appears to be scared, however, by the threats.

Carrying Parts and Tools

Gasoline tanks no longer are carried under the seats. They are most often placed on the front of the dashboard, right across the frame, the top forming a continuous line with the bonnet and the scuttle, or they are mounted on the rear of the dashboard or under the scuttle dash. The rear tank under pressure is found on a rather smaller number of cars than formerly. Both tank and radiator fillers are being made very much larger than before, in some cases being big enough for the hand to be passed inside. The arrangement is not unsightly and it may be useful.

With the craze for a clean-cut car the problem is to stow away tools, tires, batteries, etc., in a convenient manner. Only a comparatively small number of complete high-grade cars being produced by the car manufacturer, this problem is left to the bodybuilder. Lamplough has done some excellent work in this direction. In the rear panel he has built a locker of sufficient size to take a wheel with an inflated tire on it. The wheel is held in place without any straps, and the hinged door can be let down and the wheel taken out without interfering with a well filled luggage rack. Near the bottom of this chest are supplementary lockers, also lined with felt, which are ideal for carrying spare tubes. Around the top of the big chest, with admission from the back of the car are three more small lockers, suitable for tubes or spares. Under the rear floorboards and to each side of the propeller shaft, sheet steel trays are fitted. Under the front floor boards another sheet steel pan is specially designed to receive the storage battery. By this arrangement, everything connected with the car is stowed out of sight.

To provide accommodation for passengers' knick-knacks, Lamplough has fitted up handsome cabinet work at the back of the front seats. From the outside this hardly is visible, for there is a kind of scuttle at the back of the front seats which further serves to enhance the line of the car. From the inside the effect of these cabinets, in polished wood, is decidedly pleasing. This effect is shown very well on a Charron touring car, with bodywork by Lamplough. The same car is fitted with Lamplough pullman seats. Both the back and the seat are entirely independent from the body and each one can be regulated for height and inclination to suit the passenger, at a moment's notice. With these seats there is the additional advantage of being a certain isolation from the body and shocks which may be communicated to the body. Introduced a year ago, they

have been very successful and largely adopted.

A very good effect is being obtained by abolishing the polished wood top rail on open bodies. Instead of there being an abrupt stop of the side panel and a piece of polished beading placed along it to give the necessary finish, the panelling is being brought right over from the outside to the inside and well rounded. This is particularly pleasing when the sides run into a scuttle at the back of the front seats, as is done on the Charron with Lamplough body already mentioned.

In sporting circles there is a decided craze for boat-type bodies. Various body builders have taken this up with some very good effects. Turcat-Mery has produced several on lines which suggest a boat with its bow turned towards the rear. Alin & Liautard have built a series on Abadal chassis in which a striking effect is obtained by alternating the longitudinal planks of entirely different kinds of wood. This body is a three-seater partly decked over around the rear seat. Henri-Labourdette has made a specialty of boat bodies with very good results. Half a dozen are being shown on Panhard, Peugeot and Abadal chassis. Labourdette has two fore and aft oak members, on which he builds up ribs, exactly as in boat construction, and then puts on three layers of planking, two layers being diagonal and crossed and the outer layer longitudinal. The bodies are polished in their natural woods, generally mahogany, the rivet heads showing, as in pure boat construction. The upholstery is merely buttoned in.

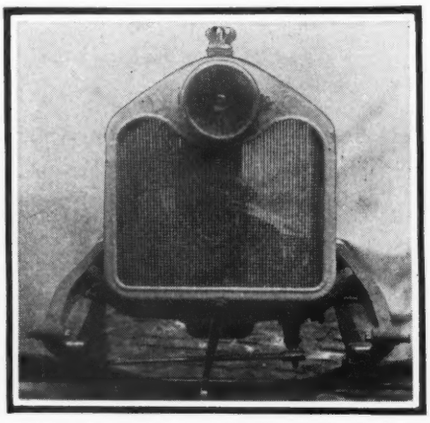
Boat Body Construction

One of the great difficulties with a body of this nature is to make the car bonnet harmonize with the boat. On the Abadal the body maker has carried the planking over the bonnet, right up to the radiator. As this latter is pointed the boat effect is most striking. Protection against scorching of the wood has been obtained by fitting a liner faced with asbestos on the inside of the bonnet. A very fine effect has been obtained on a Peugeot chassis with the Henri-Labourdette type of body. As it is practically impossible to paint these bodies owing to the presence of the rivet heads, the final covering is of canvas.

These bodies have the practical advantage of being considerably lighter any ordinary type of body and infinitely stronger. A five-passenger body has but 130 pounds of woodwork. The complete weight of a boat body varies between 280 and 350 pounds, compared with 550 to 660 pounds for an ordinary type of body with equal carrying capacity. Built up on ribs with three layers of mahogany, the greater strength is evident. This has been proved in a very practical manner, for one of the first cars went into a tree at 40 miles an hour, and although the chassis was badly wrecked not a plank had sprung in the body. Henri-Labourdette claims to have patented this construction and to have registered the design.

Briscoe's New Cars

Benjamin Briscoe, former president of the United States Motor Car Co., unveiled his two European-produced models at the Paris salon. The cars are a light five-passenger model, which will probably be put on the market around $900 all complete, and a four-cylinder cyclecar selling complete at $390. Arrangements have been made, or are in hand, for building these cars in France for the European market, and also for their construction in America.



THE BRISCOE RADIATOR

It is declared that the cyclecar can be turned out in quantities for early in the new year, and that the bigger car will follow a little later.

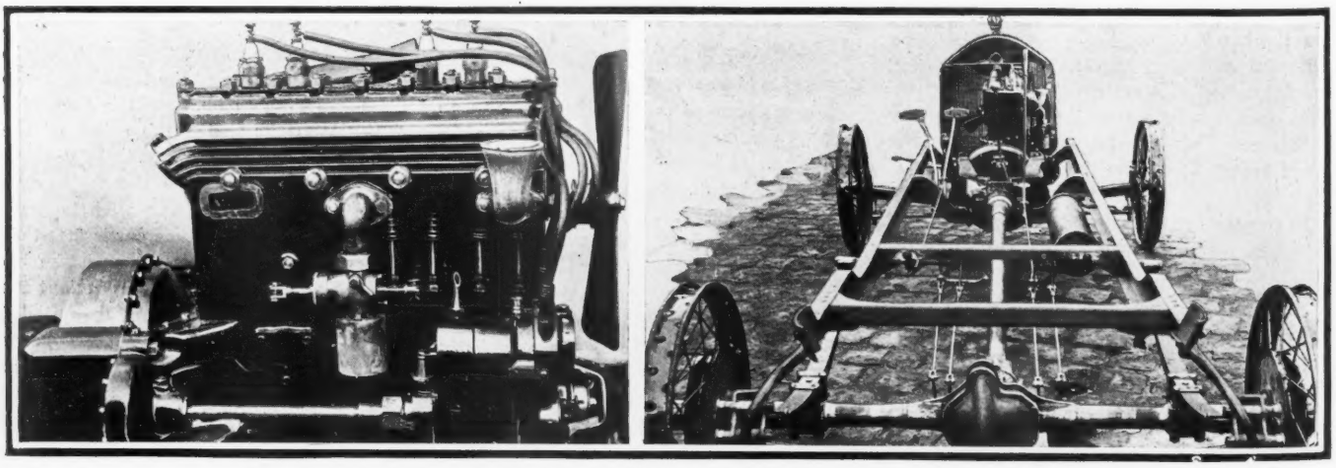
Produced by Americans in French shops, the cars naturally are a Franco-American combination. While the prevailing idea in the design of the big car is American, inspiration has been taken from the European school and European experts have assisted in the work of designing. The new Briscoe has a four-cylinder motor with unit construction, motor and gearset having three-point suspension. Cylinder dimensions are 80 by 130 millimeters or 3.1 by 5.1 inches. Cylinders are of the L-type, valves are inclosed, the camshaft is operated by timing gears at the rear, and tappets are adjustable and have fiber heads. Cylinders and crankchamber form a single casting, the bottom part being a pressed steel oil pan screwed into position. This, of course, implies a two-bearing crankshaft, the diameter of which is 1⅞ inches. The ribbed exhaust manifold is independent and bolted to the cylinders.

The carbureter is a European model connected up with a very short pipe on the valve side. A special Briscoe high-tension magneto is used, its position being on the valve side, but as far forward as possible, so as not to interfere with the accessibility of the carbureter and the valves.

Features of the Briscoe

Cast with the crankchamber are two arms partially encircling the flywheel containing the leather-faced cone clutch. The compact gearbox is bolted up to these arms, thus forming a single unit of motor and gearset. The timing gears at the rear are in a separate compartment, independent of the crankchamber and having a sheet metal plate as rear cover.

Lubrication is provided for by a circulating system. A plunger type of pump driven off the camshaft takes oil from the base, delivers it to the two main bearings and to the four troughs under the connecting rods. Control is provided by passing the oil through a sight feed on the dash before going to the main bearings. On bench tests it is declared that the mo-



VIEWS OF BENJAMIN BRISCOE'S LIGHT CARS, SHOWING MOTOR AND CHASSIS

tor develops 32 horsepower at 1,800 revolutions.

The gearset provides three speeds; it is of the selective type and has the lever mounted directly on the top of the box. The brake lever is fitted up on the right-hand side of the gearbox. The opposite side of the box is detachable, it being the intention to drive an electric lighting dynamo from the gearset, this unit being treated as an extra. Final drive is by propeller shaft with bevel gearing to full floating rear axle. The propeller and the axle shafts are of chrome vanadium spring steel; BND steel is used for the gears. The two sets of brakes are carried on the road wheels, and are concentric. This is in accordance with the European tendency to take brakes away from the transmission. Springing is by long, broad semi-elliptics, both front and rear. Wheelbase is 105 inches, tread 56 inches and chassis weight 980 pounds.

European fashion is closely copied in the body. It is of the five-passenger type without a break from bonnet back to bonnet. The gasoline tank is placed under the scuttle dash, and the headlight is incorporated in the center of the frame of the radiator. This latter is made of aluminum. The electric lights are fed from a storage battery, with a dynamo as an extra. Wire wheels are fitted.

Briscoe's New Cyclecar

Simultaneously with the five-passenger car, a popular type of cyclecar has been produced at the Briscoe factory near Paris. It is to be put on the market under the title Ajax. So far as transmission is concerned, this machine closely copies some of the best French cyclecars. The use of a four-cylinder water-cooled motor for a machine selling at the low price of the Ajax is a decided novelty in the eyes of Europeans.

The motor has a bore and stroke of 57 by 96—2.2 by 3.8 inches—and a unit casting with the crankcase. The head is detachable, and the base is a steel pan merely acting as an oil reservoir. The detachable head cannot be considered in accordance with European practice, but for a machine of this small size it is no doubt an advantage to be able to remove carbon deposit by taking off the head instead of dismounting the cylinders. Lubrication is the same as on the bigger motor. Timing gears are at the front, the housing being covered by a sheet metal plate. No aluminum is made use of in the car. Plugs are mounted direct in the head, over the intake valves.

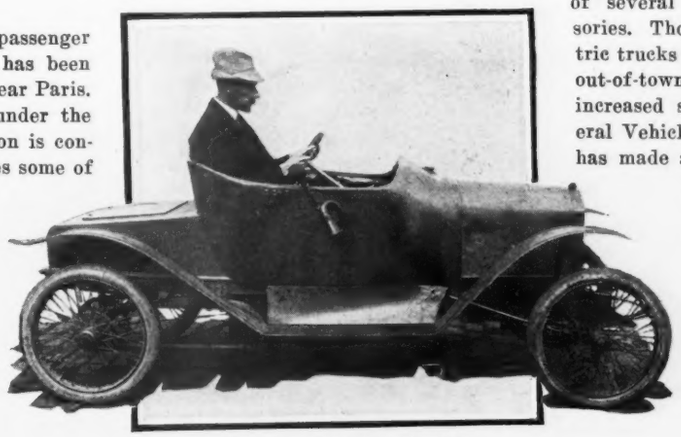
The drive shaft is connected up to the flywheel by the intermediary of a slightly flexible disk, arms on the end of the driving shaft receiving the disk, and this in turn being bolted to the flywheel. The steel driving disk is carried between two cross members immediately under the driver's seat. The cross shaft carrying the compressed paper-faced friction plate is mounted in bearings on short longitudinal members attached to the cross members, this construction making a very rigid frame for the cross shaft.

Cyclecar Features

Pressure is obtained for normal driving by means of a stout coil spring within the left hand frame member. Supplementary pressure for starting on low speed is supplied by the traction of the chain itself, for the cross shaft is mounted in a spherical S. K. F. ball bearing held in a bracket on the subsidiary frame member. By this method great leverage is obtained at low speeds by the augmented traction of the chain, the lever arm being simultaneously shortened as the disk nears the centre of the driving plate. Final drive is by a single chain to the rear axle, the two wheels being positively driven, without the use of a differential.

Rear Suspension Distinctive

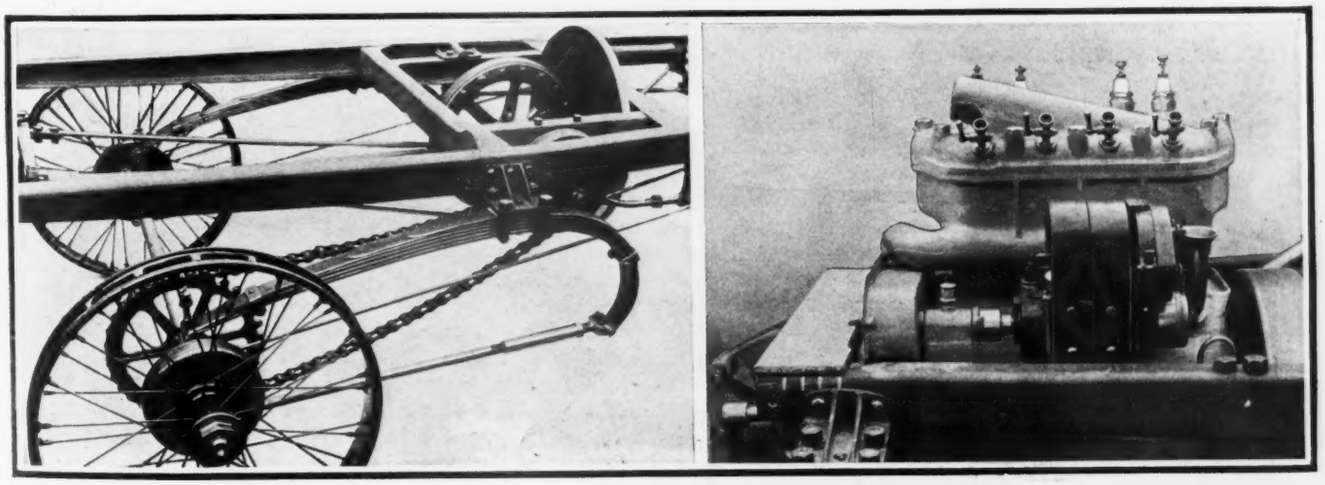
Rear suspension is rather distinctive. It is of the cantilever type, the short front arm being carried down and receiving the radius rod. Front springs are of the elliptic type. Steering is normal; detachable wire wheels are fitted, the tire size being 650 by 65 millemeter. The frame members are parallel at the rear, then gradually taper in towards the front. There are five cross members in the frame. European lines are followed in the body, the bonnet merging into a scuttle dash without a break.



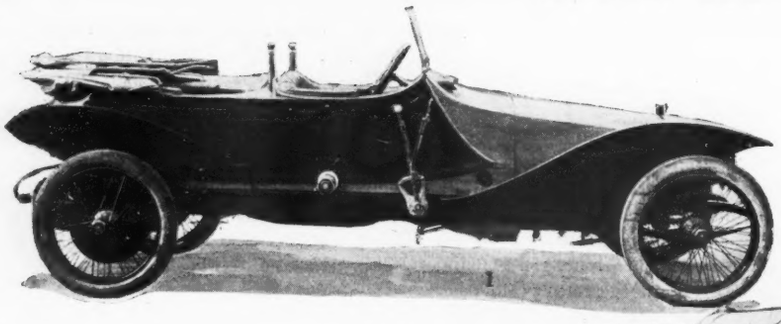
THE BRISCOE CYCLECAR

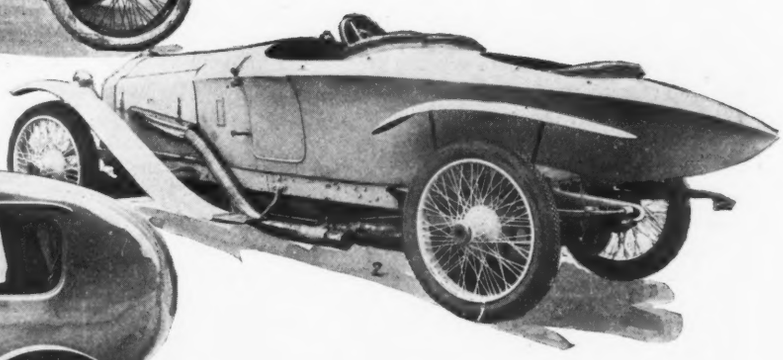
SALES AT ELECTRICAL SHOW

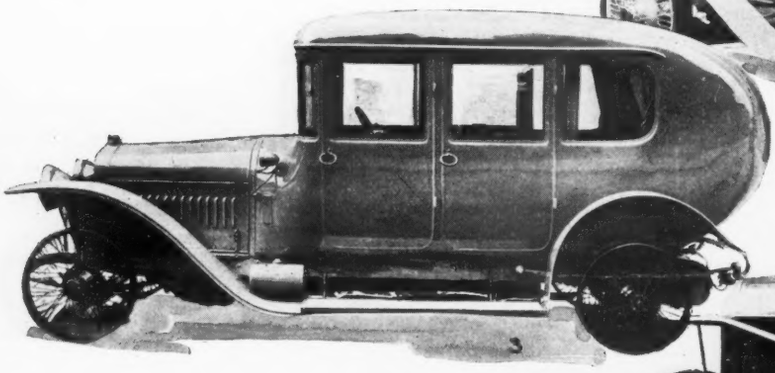
New York, Oct. 20—Increased sales and new agencies are reported at the vehicle display in the electrical show, which opened on October 15. This display includes the newest models of both commercial and electric pleasure motor cars of several companies, with their accessories. Those concerns manufacturing electric trucks state that the show has brought out-of-town buyers, and that prospects of increased sales are promising. The General Vehicle Co., Long Island City, N. Y., has made a sale of thirty trucks to Lord & Taylor of this city, and the Standard Electric Car Co., Jackson, Mich., has established an agency at Marinette, Wis., under the Menominee Light and Power Co., and also has made a sale of two cars. The General Motors Truck Co., Pontiac, Mich., also has established two eastern agencies as a result of the show.

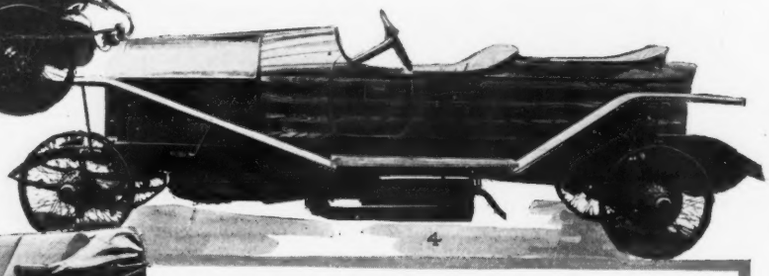


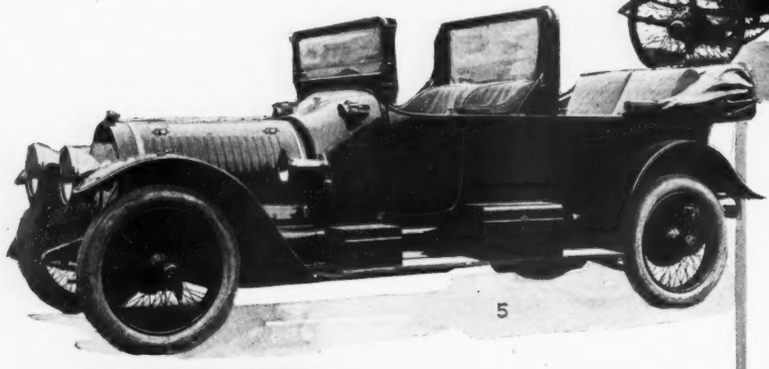
MOTOR AND CHASSIS VIEWS OF BRISCOE CYCLECAR







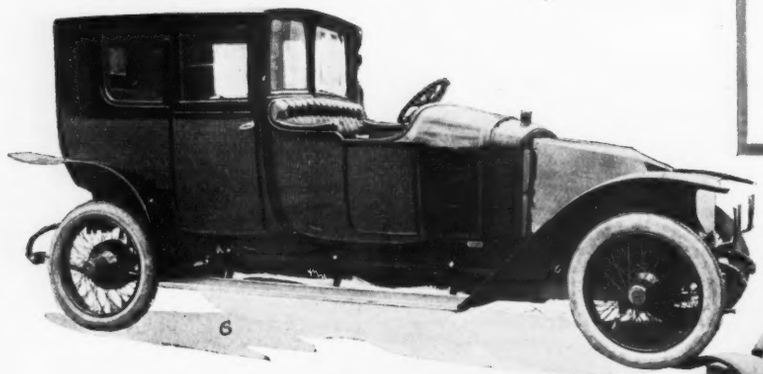


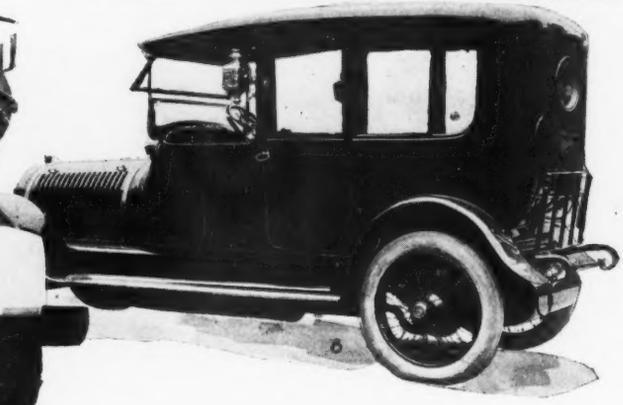


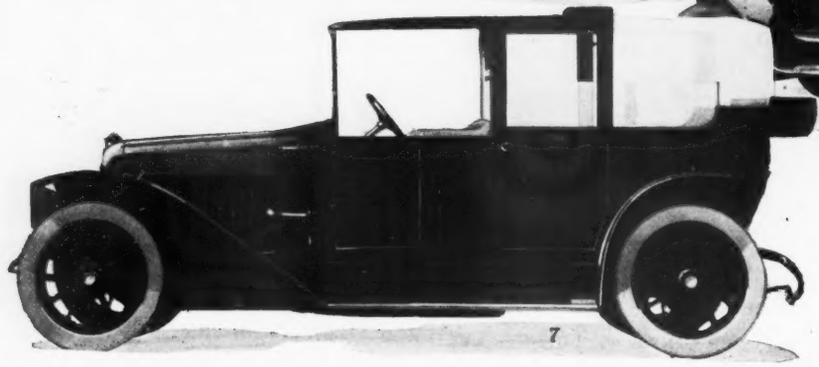
1914 *INNOVATIONS IN EUROPEAN BODIES*

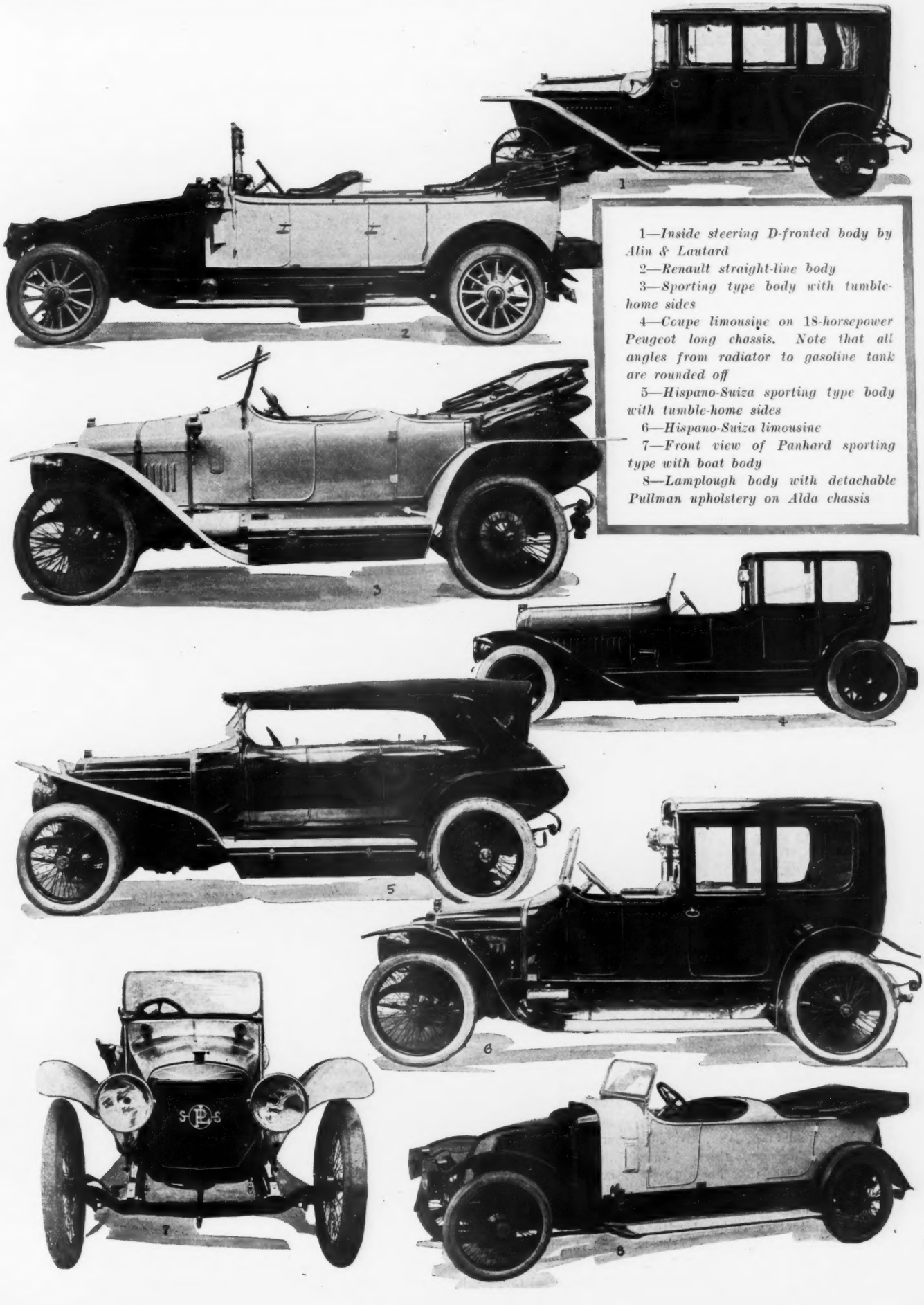
The French body builder, a master in his craft, more than upholds his reputation for 1914 and has furnished some startling innovations for the annual Paris salon. His coupe de force for the coming season is the boat type of body, four examples of which are shown on this page. The bodies illustrated are:

1—Skiff body, by Henri-Labourdette, on Panhard chassis
2—Turcat-Mery boat type body
3—D-fronted egg-shaped stern body on Hispano-Suiza chassis
4—Original boat body by Alin & Lautard
5—Hotchkiss touring body
6—Alda coupe by Henri-Labourdette
7—Hotchkiss closed car
7—Transformable landaulet on 40-horsepower Peugeot









1—*Inside steering D-fronted body by Alin & Lautard*

2—*Renault straight-line body*

3—*Sporting type body with tumble-home sides*

4—*Coupe limousine on 18-horsepower Peugeot long chassis. Note that all angles from radiator to gasoline tank are rounded off*

5—*Hispano-Suiza sporting type body with tumble-home sides*

6—*Hispano-Suiza limousine*

7—*Front view of Panhard sporting type with boat body*

8—*Lamplough body with detachable Pullman upholstery on Alda chassis*

Record by Twelve-Cylinder Sunbeam

Car Averages 110.75 m. p. h. in Race

LONDON, Oct. 4—The much-discussed and eagerly-anticipated twelve-cylinder Sunbeam, owned by Louis Coatalen and driven by Jean Chassagne, made a record-breaking debut on the Brooklands track today. Starting from scratch in the 8.5-mile handicap race for cars of 70 miles per hour or more, the monster speed creation, which has a R. A. C. rating of 47.6 horsepower, averaged 110.75 miles per hour and defeated eleven other contestants.

The record of the Sunbeam is all the more remarkable in that it was made in a handicap race, and Chassagne was forced to thread his way through a field of eleven cars. No doubt on a clear track, the average speed would have been greater.

For a single circuit of the 2¾-mile track, the Sunbeam averaged 118.58 miles per hour, a velocity that has been bettered but twice in the history of the Brooklands course—Victor Hemery's flying ½-mile record of 127.877 miles per hour and the world's flying kilometer record of 125.947 miles per hour being the only marks that eclipse that of the Sunbeam.

The record-breaking achievement of the Sunbeam was a fitting finale to the spectacular track racing season that closed today. It was the first appearance of the twelve-cylinder machine in competition. Although entered in the last meeting, it failed to start as the makers were correcting some minor faults.

Starting from scratch with Chassagne was Percy Lambert, the first man to drive 100 miles within an hour. He was at the wheel of Lord Shrewsbury's 25.5-horsepower Lambert. Both he and Chassagne gave starts up to 1 minute and 48 seconds. Of the two scratch cars, the Talbot was the smarter in getting away but the Sunbeam, which developed 178 horsepower at high speed, gave a stern chase and only awaited its opportunity to pass Lambert's mount.

At the high speed at which both cars were travelling, each required the top of the banking at the curves but on the second lap Chassagne, resolving to flirt with chance, cut down to the inside and at a 2 miles per minute pace flashed past the Talbot with a wrench that scraped the tread off of one of the Sunbeam's front tires.

Once in front, it was no task for the Sunbeam to win from a field of twelve starters by 250 yards. R. S. Witchell, in a Straker-Squire of 18.8 horsepower rating, was second and C. A. Bird, driving a 15.9-horsepower Sunbeam, third. Jules Goux, in the Peugeot that holds the 1-hour record, failed to place.

The latest and most novel speed creation of the Sunbeam factory is fitted with a twelve-cylinder aviation engine of exactly the same proportions as the 12-16 horsepower four-cylinder standard Sunbeam cars. The bore measurement is 3.25 inches and the stroke is 5.625 inches, giving a piston displacement of 550 cubic inches. Today, the maximum motor revolutions per minute were 2,000, a speed at which the engine develops 178 horsepower, but it is capable of 3,000 revolutions per minutes or the development of 250 horsepower.

ELIMINATING GRADE CROSSINGS

Kansas City, Mo., Oct. 20—The states of Missouri and Kansas have undertaken the elimination of the dangerous grade crossing. In Missouri the state public utilities commission has announced a policy by which in 10 or 15 years all such crossings will have been converted either into subways or overhead viaducts. It has employed J. L. Harrup, an expert engineer from Wisconsin, at a salary of 3,600 a year and he will give his entire time to that work. Already hearings have been held in St. Louis and St. Joseph and a number of crossings ordered changed. A similar hearing will be held here within the next few weeks.

In Kansas, the utilities commission has commenced a survey of the situation there, co-operating with the highway engineer connected with the state agricultural school. Kansas has, perhaps, the least serious grade crossing problem of any state. Being a prairie country with little hilly or rough territory the crossings are not generally hidden under high banks or by heavily wooded slopes.

A. A. A. PATHFINDER CHECKS IN

New York, Oct. 18—The arrival in New York, on Thursday, of W. O. L. Westgard, field representative of the American Automobile Association, completed the longest and in some respects the most important of the five cross-country routes so far logged by the national organization. Starting from Los Angeles after the completion of the Indiana makers tour, the Trail to Sunset was followed through San Diego and Yuma to Phoenix, Ariz., where, leaving the Santa Fe trail, a southerly detour was made along the line of the Borderland route through Tucson, Bisbee, and Douglas to Lordsburg, N. M. On account of the equal importance of the two routes across southern Arizona, it was decided to use both, which required a loop back to Phoenix by Clifton, Globe, and Roosevelt dam, and then east again to Lordsburg, making three trips between Phoenix and Lordsburg.

After crossing the Rio Grande river, a southwesterly course was followed to El Paso, thence northeasterly to Alamogordo, and through Roswell, Sweetwater, Abeline, and Fort Worth to Dallas. Leaving Dallas, the route led to Texarkana, where the Red river was crossed into Arkansas. From Memphis, Tenn., the route of the proposed Memphis-to-Bristol highway was followed to Nashville. After careful investigation, it was considered best to take the longer way from Nashville to Knoxville via Chattanooga, which constituted the only deviation on the entire trip from the route of the Southern National Transcontinental highway.

From Knoxville, the short line was taken across the mountains to Asheville, N. C. Leaving Asheville, the route led through Statesville, Salisbury, and Greensboro to Durham, N. C., where the line of the Quebec-Miami International highway was met and followed north through Clarksville, Boydton, Dinwiddie and Petersburg to Richmond, Va. After traversing the short line between Richmond and Washington, which though not yet completed will be finished next year, the standard route was followed from the national capital through Baltimore, Wilmington and Philadelphia to New York.

MILWAUKEEANS HARASSED

Milwaukee, Wis., Oct 18—Motorists of Milwaukee are face to face with ordinances which practically legislate them off the principal streets and so curtail their rights on the other streets of the city that a mass meeting has been called by the Milwaukee Automobile Club for Thursday evening, October 28, to outline a hand-to-hand fight in which all motorists will be requested to participate to the end of stopping further incursions on their personal liberties and lawful rights. The club consists of 500 members and there are 5,000 or more motorists in Milwaukee and the idea of the mass-meeting is to get non-members, who have been standing idly by while the club has fought, to show their colors.

Three ordinances were passed recently, effective October 27, which are believed by club officials to be contrary to the new Wisconsin state motor code, prohibiting municipalities from enacting and enforcing local motor legislation. The most obnoxious of the new ordinances is one fixing a zone which takes in about thirty city blocks in the heart of downtown Milwaukee, and in which no vehicle is permitted to remain standing between 6 o'clock a. m. and 7 o'clock p. m., except for the purpose of receiving or discharging passengers.

Another ordinances says no vehicle shall be allowed to stand upon any of the public street, alleys or other public places in the city of Milwaukee for a longer time than is necessary for the receiving or discharging of passengers or freight * * * excepting in emergency cases where it is reasonably necessary that vehicles be left standing in public places * * * nor shall it prohibit the standing in such streets, alleys or public places for longer than 45 minutes of vehicles which are in use for social or business purposes.

The effect of this ordinance is believed to be that vehicles may stand on any street for 45 minutes only. The law is considered ambiguous. Its redeeming feature is that it contains a clause prohibiting pedestrians from making "Dutch cuts" at street intersections in the downtown district on penalty of from $5 to $50. A third ordinance regulates the emission of smoke and odors from motor vehicles and motorcycles.

When the new state motor law was passed, Wisconsin and Milwaukee motorists believed their troubles were ended, so far as having to fear further harassing or voluminous local legislation.

TWO HUNDRED CLUB ELECTION

Chicago, Oct. 20—The first meeting of the Two Hundred Club was held tonight when E. C. Patterson, founder of the organization, was elected president, W. E. Stalnaker vice-president, R.O. Evans treasurer and George F. Ballou secretary. All are Chicagoans. Thirteen of the forty-one members of the club, which has members in the states, were present. A change in the rules was made whereby aspirants for membership need give only 2 days' notice of their intention to try to drive 200 miles in 10 hours without a motor stop, while members, trying for additional honors, need give only 12 hours' notice. The headquarters of the organization will be in the Westminster building, Chicago.

TEN YEARS FOR CAR THEFT

Los Angeles, Cal., Oct. 20—In the future all motor car thieves convicted in the criminal court of Los Angeles will be sentenced to 10 years in the penitentiary. This was the official edict of Judge Willis today when he imposed the extreme penalty for grand larceny, a 10-year penitentiary sentence, upon G. S. Graham, who was found guilty of stealing a motor car.

"The joy-riding thief is a menace to the public," declared Judge Willis in pronouncing sentence, "and deserves no sympathy. In sentencing this man for 10 years, I have established a precedent that I will follow."

PRINCE EDWARD ISLAND OPENED

Montreal, Oct. 18—At last Prince Edward Island, the only province in the dominion that has successfully held out against the motor car, has passed legislation that permits the operation of motors in a restricted district on certain days. Motor vehicles are allowed to be operated in Charlottetown royalty and on the Union road, and within the limits of the town of Summerside on Monday, Wednesday and Thursday. The royalty comprises an area of about 4 miles east, west and north of Charlottetown, and Union road covers a distance of 17 miles, and by it motorists may reach the Cliff hotel and Mutches hotel at Stanhope, which are both on the north shore of Prince Edward island.

Preparing for the Desert Road Race

Good Entry for Los Angeles-Phoenix Event

LOS ANGELES, Cal., Oct. 17—Shortly after sunrise on the morning of November 3, Cadillac racing car No. 1 with Charles Soules at the wheel, will be given the count and the 1913 Los Angeles-Phoenix road race will be underway.

As in previous years, the course over which the cars will be piloted, provides innumerable tests in the way of rough stretches of roads which will have to be negotiated at high speed, winding mountainous trails and steep grades. And later, the drivers will be forced to overcome the barrier of shifting sands which accounts for the naming of the inter-city race, the desert classic.

According to present indications, there will be at least twenty or twenty-five cars lined up for the start of the gruelling race. Twelve entrants already have posted checks to cover the entrance fees.

Word comes from Phoenix and San Diego that racing cars are being fitted-out almost every day, and several of the machines have been seen out on the roads, piloted by drivers who are studying the road conditions.

Don Lee, the distributor for the Cadillac car, was the first enthusiast to send in signed entry blanks. Numbers 1 and 3 will be carried by Cadillac cars, and the pilots already have been over the road, securing information regarding the conditions which will have to be encountered in the race.

A great deal of assistance has been given by the people of San Diego to the furthering of the plans for the big event, and with Phoenix, San Diego and Los Angeles working together, everything will be in readiness for the staging of the best and most interesting desert race ever contemplated.

From Los Angeles, the cars will be piloted over boulevards for about 25 miles, after which fair country roads will be encountered. The road to San Diego is good and bad in places, but racing drivers who have been over the route predict that an average rate of speed in excess of 50 miles an hour will be registered during the progress of the race between the start and the checking point at San Diego.

Between San Diego and the border of the desert, a range of mountains will have to be traversed, and many difficult turns will have to be made, which will materially cut down the speed of the cars.

The dreaded Mammouth Wash, a stretch of deep shifting sand almost a mile in length is bound to prove a stumbling block for a number of ambitious pilots, as a car will sink clear to the axle, if the wheels are shoved over out of the beaten track.

In one place, there is a stretch of road 14 miles long, over the desert sands, where water is not obtainable, and this section could easily be called "Death Valley II," as a large number of desert travellers have lost their lives on account of the scarcity of water.

Stopping for an over-night rest at Yuma, the drivers will send their cars on over the Colorado the next morning, and the finish will be made in the afternoon.

The next day, a three-event card of races will be staged by the Maricopa Automobile Club at the Phoenix race track, and a purse of $2,700 will be divided.

ST. LOUIS IMPROVING TRAFFIC RULES

St. Louis, Mo., Oct. 19—Another step to make St. Louis a big city in methods of handling traffic was taken this week when Street Commissioner Talbert had traffic dead lines painted in the busy streets downtown. The purpose of the regulation is to restrain all traffic within the lines until signalled to proceed, and thus to allow all the space possible for the stream of moving traffic that has the right of way. The trouble with the new move now is the inability of the officials to find a paint that will not wear off in a day or so.

Another move to help along the congested conditions which experts say are worse here than in any other city, is a plan for parking motor cars in the downtown districts. At present drivers stop and park their cars wherever it suits them. The street commissioner suggests the passage of an ordinance that would limit stopping time to 30 minutes in any one block and have police stationed in each block recording the time the car was stopped and its license number.

A canvass of the streets bounded by Fourth and Twelfth streets on the east and west and Chestnut and Washington avenues on the south and north, an area of about thirty blocks, showed that 585 motor cars and 220 horse-drawn vehicles stood still at the curbs for more than 30 minutes and in some cases all day.

AMATEURS WIN BANTA TROPHY

Chicago, Oct. 20—The third annual team match for the Banta trophy conducted by the Chicago Motor Club, took place Friday and Saturday of last week and again was won by the amateurs. The trip was to Sulphur Lick Springs, Ill., and the affair was of a somewhat farcical nature. Only three of the eighteen entrants started because of the weather conditions. J. Frank Meyer with a Ford and Larry Ownes, representing the amateurs, while George Spangle was the only tradesman to turn out. Owens drew 1 point for a motor stop, while Spangle drew 190 points for magneto trouble, which gave the victory to the amateurs.

Kansas City Ranks Third as Distributing Center for Cars

Does Business Amounting to $16,500,000 in 12 Months

KANSAS CITY, Mo., Oct. 20—This city has risen to third place in this country as a distributing center for motor cars and accessories, according to figures recently made public by E. P. Moriaty, president of the local dealers' association. Only New York and Chicago surpass it.

During the 12 months just ended, the sale of passenger cars here has amounted to $12,000,000 and of commercials about $1,500,000, the figures announce. The tire and accessory business is placed at $3,000,000, although other members of the association declared that amount too small.

The local Ford agency reports having sold 5,000 cars from Kansas City during the year, the Overland 3,000, the Buick 1,500, and the Studebaker Corp. cars valued at a million and a half. The United States Tire Co. has done as large a business in tires as the Studebaker company did in cars, it is claimed.

Kansas City's trade territory includes the western half of Missouri, all of Kansas and Oklahoma, and parts of Nebraska and Texas. The number of concerns engaged in that business here is given as 180.

INTER-STATE IN RECEIVER'S HANDS

Indianapolis, Ind., Oct. 22—Michael J. Broderick has been appointed receiver for the Inter-State Automobile Co., of Muncie, by the circuit court in that city. The receivership was based on a petition filed by Thomas F. Hart, president of the company.

Mr. Hart says that the company has liabilities amounting to approximately $500,000 and that the concern is insolvent. He says also many large accounts are due the company, which it is impossible to collect. The company has outstanding common stock amounting to $195,000 and preferred stock to the amount of $100,000.

According to Mr. Hart, there has been dissension among stock holders which has prevented the company obtaining additional money, which has been badly needed to carry on current operations. The stockholders are all wealthy men. The assets of the company include the factory buildings, equipment, several finished cars and accounts in the sum of $43,638.34.

Judge Frank Ellis, who appointed the receiver, has ordered that manufacturing operations continue until orders in hand are filled or until the supply of material is exhausted. The receiver has given bond in the sum of $300,000.

PACKARD DECLARES STOCK DIVIDEND

Detroit, Mich., Oct. 18—A stock dividend of 40 per cent was authorized at the meeting of the stockholders of the Packard Motor Car Co. at the company's offices in this city on October 16. The directors' recommendations that the capital stock be increased from $10,000,000 to $16,000,000 also were approved, the additional being half common and half preferred, raising the total of each to $8,000,000 from $5,000,000.

Practically all of the stockholders acquiesced in the proposed plan of waiving their right of subscription to the $1,000,000 of new common stock which amount will remain after the distribution of the $2,000,000 stock dividend, similar action being taken with regards to the $3,000,000 of new preferred.

For the present $1,000,000 of the new common stock will be retained as treasury stock to be issued as funds are needed according to the requirements of the business. The $3,000,000 of preferred will also be held as a reserve to take up the company's issue of $3,000,000 in 5-year, 5 per cent gold notes, due December 1, 1916, and also for such other company uses as may be later determined. All of the directors and officers were re-elected.

The report of the Packard Motor Car Co. as of August 31, 1913, compares as follows:

	1913.	1912.	Changes.
Net inc. after dep.	$2,157,472	$2,182,376	†$24,904
Pfd. dividend	350,000	350,000	.....
Surplus	*1,807,472	1,832,376	†24,904
Prev. surplus	1,198,784	.....	.....
Total surplus	3,006,256	.....	.....

*Equal to 36.15 per cent earned on $5,000,000 capital stock as compared with 36.6 per cent earned on same stock previous year.
†Decrease.

The balance sheet of the Packard company, as of August 31, 1913, shows assets as follows: Plant, $5,260,950; investment in branch selling companies, $1,481,894; miscellaneous investments, $80,733; inventories, $8,136,025; current assets, $2,226,406; expense paid in advance, $153,840; total, $17,339,848. Liabilities—Capital stock, $10,000,000; gold notes, $3,000,000; accounts payable, $1,154,875; reserves, $178,717; profit and loss surplus, $3,006,256; total, $17,339,848.

JEFFERY ABANDONS BRANCHES

Kenosha, Wis., Oct. 22—A change in the sales policy of the Thomas B. Jeffery Co. of this city will mark the marketing of the 1914 output. The direct factory branches, heretofore maintained in New York, Boston, Philadelphia, Chicago, Milwaukee and San Francisco, have been or will be abandoned and replaced by agencies, three of which already have been appointed.

The Chicago sales, formerly handled direct by the maker, are now in the hands of the Centaur Motor Co. of Illinois, a deal having been consummated with A. M. Robbins, the manager, some time ago. The Pacific coast sales have been transferred to the Jeffery Auto Sales Co., of San Francisco. In Milwaukee, the Reeke-Osmond Motor Car Co. have taken over the Jeffery interests and will control the state of Wisconsin and the northern Michigan peninsula.

Deals are pending in New York, Philadelphia and Boston which will give the new Jeffery wide distribution along the Atlantic seaboard.

In connection with the announcement of the new Jeffery 1914 line it is stated that the prices on the Cross Country, which will be continued for 1914, will be as follows. Five-passenger touring, $1,875; four-passenger touring, $1,875; roadster, $1,815; Gotham, $2,575; Gotham body, $1,200.

MASON RECEIVER NAMED

Waterloo, Ia., Oct. 7—Ira J. Hoover has been appointed receiver of the Mason Motor Co. The appointment was made in accordance with a petition filed by Fred W. Powers, trustee. An answer filed by the defendant company at the same time consented to the receivership and also consented to the sale of the property without right of equity or redemption by the defendant company be made as provided by a trust deed previously given Dr. Powers to secure a $150,000 bond issue. Judgment was asked by the plaintiff for the amount due on $100,000 worth of the bonds, together with interest on $36,000 worth of bonds from July 1, 1913, and interest on $64,000 worth of bonds from January 1, 1912. According to the attorney for the plaintiff the total amount of judgment will be somewhere between $65,000 and $70,000.

WARD MAKING NEW MODEL

New York, Oct. 18—Plans for the entry of the Ward Motor Vehicle Co., New York city, into the passenger vehicle field were revealed here today. A new electric chassis, embodying many new and radical features in Ward chassis has been designed, experimental models tried out, and orders taken. These first models are being applied commercially, but body builders already are at work on a luxuriously-appointed passenger body which it is expected will be ready in time for the motor vehicle show next January.

What first strikes one in the chassis is the low drop frame, only 18 inches from the ground. This frame is connected to the front axle by the conventional semi-elliptic springs, but in the rear a brand new form is used. Back in the old coaching days such springs were used. Long leaves extend to a standard shackle in front of the axle, but as the spring extends to the rear, it curves upward until it doubles back and forms a complete semi-circle. Here in place of the long leather straps which our forefathers used, the Wards have placed a business-like shackle of sufficient length to give the spring full

freedom. The leaves of the spring on the upturned portion are cut away on the opposite side to those on the straight portion because at this part the spring is superimposed.

The power plant of the new vehicle consists of a Westinghouse motor running on ball bearings mounted rigidly to the frame in the rear. Direct drive is used through a shaft with two universals to the Timken bevel-driven axle in the rear. The tires are 32 by 2½ on all wheels, while they track the standard 56 inches. The chassis was exhibited for the first time at the electric show now being held at the Grand Central Palace in New York.

MORE SHOW EXHIBITORS

New York, Oct. 22—Special telegram—A large number of concerns which are not members of the Motor and Accessory Manufacturers have secured space for the New York and Chicago shows. Prominent among these additions are several tire concerns which will exhibit their products. A number of makers of motor cars who are not members of the Automobile Chamber of Commerce, have applied for space to Manager S. A. Miles. Below is given the additions to the accessory list for the Chicago exhibition which will be issued next week. The list of exhibitors published up to date is not in complete form as a number of changes and additions will be made from time to time. When complete the list will be a record-breaker for both shows.

Northway Motor and Mfg. Co., Miller Rubber Co., Crescent Motor Co., Champion Spark Plug Co., Cleveland Hardware Co., Allen Motor Co., Rushmore Dynamo Works, Rich Tool Co., J. R. Ashley Co., William R. Laidlaw, Jr., C. A. Willeys Co., Model Gas Engine Works, P. Reilly & Son, Charles E. Miller, Frazer Lubricator Co., Peter A. Frass & Co., Inc., Jones Electric Starter Co., Peteler Shock Absorber Corp., Universal Lubricating Co., Bock Bearing Co., Fentress Newton Mfg. Co., Howe Rubber Co., International Metal Polish Co., Fitzgerald Mfg. Co., Perkins Campbell Co., Columb Tyres Import Co., Inc., J. Eavenson & Son, Inc., Havoline Oil Co., Johns-Mansville Co., Donnelly Motor Equipment Co., David Kahnweiler Sons, Cox Brass Mfg. Co., Asch & Co., Inc., Universal Shock Eliminator, Inc., Eveland Engineering and Mfg. Co., Baush Machine Tool Co., Motor Patents Co., Pyrene Mfg. Co., Emil Grossman Co., Rhineland Machine Works Co., New York Coil Co., J. Alexander Mfg. Co., John T. Stanley Thermoid Rubber Co., Motor, Metal Stamping Co., Wayne Oil Tank & Pump Co., S. P. Townsend & Co., Aristos Co., L. Sonneborn Sons, Inc., Charles O. Tingley & Co., Baums Castorine Co., United and Globe Rubber Mfg. Co., Platt & Washburn Refining Co., Ajax Trunk and Sample Case Co., Asbestos and Rubber Works of America, H. P. B. Electric Co., Newmastic Co., Thurber Rotary Starter Co., English & Mersick Co., R. I. V. Co., Nonpareil Horn Mfg. Co., Marburg Bros., Inc., H. H. Franklin Mfg. Co., Berg Auto Trunk and Specialty Co., H. B. Arnold, National Rubber Co., Majestic Mfg. Co., Julian H. Faw, American Taximeter Co., A. R. Justice Co., Inc., Eclipse Machine Co., B. & L. Auto Lamp Co., Standard Woven Fabric Co., W. H. Brown, Houpert Machine Co., Silver Co., Detroit Steel Products Co., Hawthorne Mfg. Co., Inc., Ernst Flentje, Essex Rubber, Inc., Golde Patent Mfg. Co., Chilton Mfg. Co., Perfection Spring Co., Thomas Prosser & Son, K. W. Ignition Co., L. J. Mutty Co., Ralph Waldt, McQuay Norris Mfg. Co., United States Gauge Co., Mayo Mfg. Co., Brown Co., Stevens & Co., F. A. Baker & Co.

WANT R. C. H. CALLED BANKRUPT

Detroit, Mich., Oct. 21—Three merchandise creditors of the R. C. H. Corp., Detroit, now in the hands of a receiver, have filed a petition in the United States district court here before Judge Tuttle to place the corporation in involuntary bankruptcy. Their claims against the R. C. H. amount to about $10,000. Certain investigations now are under way to determine whether or not the present receivership policy is to the best interests of the creditors or whether it would be best to throw the corporation into bankruptcy. The court ruling which is expected next week will depend upon the findings of this investigation.

STEPHENSON BANKRUPT

Milwaukee, Wis., Oct. 22—Special telegram—The Stephenson Motor Truck Co. was today thrown into bankruptcy on petition of three creditors. The company ceased operations several months ago, following a decision favoring the Case company in a suit brought by the Stephenson company.

ANSWER BARBER SPARK PLUG SUITS

New York, Oct. 21—The first of the alleged infringing companies, the Lowe Motor Supplies Co., sued by William Barber has filed an answer. On October 2, it will be remembered, William Barber filed a suit in the United States district court for the southern district of New York, claiming a basic patent infringement against the following concerns: The Smith-Haines Co., the Motor Car Equipment Co., and the Lowe Motor Supplies Co., all accessory concerns in this city. He claimed a basic patent on the type of spark plug which bears the names Red Head, V-Ray and Sootless. Mr. Barber's patent No. 732,032, of June 30, 1903, refers to a spark plug wherein the porcelain is inside the bushing at the ignition and extends part way back through the plug toward the cable end. The remainder of the insulating material is specified as being of some substance less brittle than procelain. In its answer, the defendant denies that it has any knowledge or information sufficient to form a belief as to any of the allegations of the complaint in the mentioned parts.

The Motor Car Equipment Co., also has filed a demurrer in the United States district court for the southern district of New York.

*November 2-3—Los Angeles-Phoenix road race.
*November 4-5—Road race, El Paso, Tex., to Phoenix.
*November 6—Track meet, Phoenix, Ariz.
November 7-8—Gasoline economy run, Quaker City Motor Club, Philadelphia.
May 30—Indianapolis 500-mile race.

*Sanctioned by A. A. A.

SHOWS, CONVENTIONS, ETC.

October 15-25—Electric show, Grand Central palace, New York city.
October 17-27—Paris show.
October 18-November 2—Dallas, Tex., show.
October 21-24—Trans-Mississippi Commercial Congress, Wichita, Kan.
October 27-28—Convention Electric Vehicle Association of America, Chicago.
November 7-15—Olympia show.
November 8-15—Atlanta show.
December 9-12—Annual convention of American Road Builders' Association, Philadelphia.
December 11-20—First International Exposition of Safety and Sanitation, New York city, American Museum of Safety.
January 2-10—Importers' Automobile Salon, Hotel Astor, New York.
January 3-10—New York show, Grand Central palace.
January 4-8—S. A. E. meeting, New York.
January 10-16—Milwaukee, Wis., show.
January 10-17—Show, Cleveland, O.
January 10-21—Show, Brussels, Belgium.
January 24—February 7—Show, Montreal Can.
January 24-31—Rochester, N. Y., show.
January 24-31—Chicago show.
January 26-31—Scranton, Pa.
January 31-February 7—Minneapolis show.
February 2-7—Buffalo passenger car show.
February 9-14—Buffalo truck show.
February 16-21—Kansas City show.
February 18-21—Bloomington, Ill., show.
February 21-28—Newark, N. J.
February 22—March 5—Cincinnati, O.
February 23-28—Omaha show.
March 2-6—Show, Ft. Dodge, Ia.
March 7-14—Boston passenger car show.
March 9-14—Show at Des Moines, Ia.
March 17-21—Boston truck show.

COLE TEST CAR ENDS TRIP

Indianapolis, Ind., Oct. 20—Tanned to a glowing brown, feeling as fine and strong as the cub bear that rode with them, the Cole transcontinental testers came back home. Fifteen states and the province of British Columbia, a consuming enthusiasm over the west and a speedometer reading 8,800 miles, told the story of the 3 months' test trip. There was a long line of cars and a big crowd of friends to meet the returning trio at Plainfield, about 15 miles from the city limits. A parade through the business district and an informal reception at the Columbia Club marked the conclusion of the test trip made by Charles S. Crawford, chief engineer; H. C. Bradfield, field advertising manager, and Lew Pettijohn, chief tester, of the Cole Motor Car Co.

TRUCK TO ENCIRCLE GLOBE

Detroit, Mich., Oct. 21—An American light delivery car is soon to start on a world-girdling tour of 2 year's duration during which time it will travel thousands of miles overland. The Smythfield Export Co., of Philadelphia, has selected a Commerce truck to carry its samples in a selling campaign to be carried on in every large city in the world outside of the United States and Canada. On the conclusion of the trip, 250 Commerce trucks will be shipped to foreign points which the exporting company will specify. The truck, together with ten representatives of the Smythfield company, will sail for Sydney December 12. Long trips in India, China, Japan and Europe are scheduled.

STEPHEN BULL, SR., CRITICALLY ILL

Racine, Wis.—Stephen Bull, Sr., one of the four who established the industries now known as the J. I. Case T. M. Co. of Racine, Wis., is critically ill at his home in Racine and because of his advanced age, 89 years, little hope is held out for his recovery.

The Readers' Clearing House

WANTS CORRECT WEIGHTS

BILLINGS, MONT.—Editor Motor Age—I want to congratulate Motor Age on the many practical as well as entertaining articles that appear in it from week to week, and to suggest that it can render the public a still greater service by advocating that all builders of motor cars, who expect a permanent business, take the public into their confidence and tell the whole truth about their cars.

To illustrate: every thinking owner-driver who drives a car for real service wants the lightest car he can buy that has power, comfort and stability. He, therefore, first of all, desires to know the weight of a car, its actual power and then its facilities for comfort. Then he wants to know the actual clearance, the actual speed he would get by running his engine at the same number of revolutions per minute in the several gears.

I have before me a dozen catalogues of as many different makes of cars and not one gives all this information. How long will it take manufacturers to learn that the average driver of a machine is going to know all these things before he buys, and that it is both honest and practical to tell plainly in the catalogue what is to be learned someway, somehow?

I am driving a car that has carried me more than 6,000 miles in 4 months, a car that is now in the hands of receivers who refuse to carry out the agreement to furnish any defective part without charge, and a car on which the electric starter, while guaranteed by the builder of that particular part of the car, the maker refuses absolutely to live up to the guarantee.

The car has given unusually good service as a whole, but I for one want to know in the future the financial standing, as well as the disposition to carry out its promises, of the company from which I buy a car. It seems to me that these are things in which subscribers to Motor Age are most vitally interested and to which Motor Age well could turn its attention. I was interested in what was published recently concerninig the frank, straight talk allowed by English trade papers and think we might well profit by emulating their example.—O. P. Sturm.

DOES DRAIN INJURE THE MAGNETO

Ford Instrument Being Used Successfully for Operating Headlights

CHAMPAIGN, Ill.—Editor Motor Age.—Approximately what mileage per gallon of gasoline could one get with the following 1914 cars: Ford, model B-25 Buick, Overland, Studebaker 25 and Reo?

2—What, if any, are the advantages of a two-speed axle over a four-speed transmission, in which the fourth speed is geared up and third speed is direct drive?

3—Is it detrimental to the efficiency of a Ford to light the headlights from the magneto?

4—What is the gear ratio and complete weight of a 1911 Packard 18?—Edwin J. Bartz.

1—Following are the cars suffixed with the mileage per gallon obtainable. The figures are Chicago agents' claims. Ford, 17-20; Buick, 25; Overland, 16-18; Studebaker, 25,-18; Reo, 15-18.

3—With the two-speed rear axle it is possible to get the most efficient gear ratio for a given road condition, it is claimed. When in use with a three-speed gearset the two-speed axle affords six forward speeds, three with one pinion and three with the other.

4—It is not considered detrimental to the magneto to use it as a source of current for the headlights, but it may detract from the efficiency of the magneto as an ignition source. Also, it invalidates the Ford guarantee.

5—The 1911 Packard 18 weighs 3,000 pounds and the stock gear ratio is 3.52 to 1.

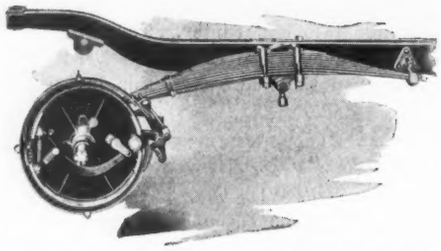


FIG. 1—TYPE OF CANTILEVER SUSPENSION

Rear spring used on King car and which is said to reduce sideway and prevent excessive rebound

ON CANTILEVER REAR SUSPENSION

Claimed to Check Rebound and Also Prevent Side Sway

Kewanee, Ill.—Editor Motor Age—Give a diagram of and tell why the Lanchester cantilever spring is supposed to be better than elliptic springs.

2—Does the winding of a generator control the kind of current, that is, whether direct or alternating?

3—Will an incandescent light burn on either kind of a current?

4—If not, how can the same generator light the lights and charge the storage battery without the use of a transformer for one or the other?

5—How does the Ford car light its light and have ignition on the same magneto without using brushes or a commutator?—R. Stanley Anderson.

1—The modified cantilever spring suspension as used on the King car is shown in Fig. 1. The action of such a spring is said to reduce side sway and excessive rebound to a minimum. The spring is supported at a point near the middle. The support is not rigid, the spring being said to be pivoted at this point. The rear end of the spring is shackled to the rear axle housing and the forward end is fastened to the frame. The line of transmission of shock is upward at the rear part of the spring and then downward at the front portion. In this way the shock never is transmitted to the passengers, but is taken by one end of the spring and transmitted to the other.

2—No. All machines initially generate alternating current in the armature, but on direct current machines this is changed into direct by the use of a commutator on the armature. A direct current machine then generates alternating current in the armature winding and after it leaves the winding it is transformed into direct current.

3—Yes, but some types of lamps burn better on direct current than on alternating. This is true of tantalum lamps.

4—The generators all are direct-current machines if they are used for battery charging, for batteries cannot be charged with alternating current. If the generator is not a direct-current producer a rectifier must be placed in the battery circuit. Filament disintegration is the only result of using direct and then alternating current for operating the same lamps.

5—The magneto generates an alternating current and this current may be used for lighting the lamps. No storage battery is used.

Questions Answered and Communications Received

O. P. Sturm.....Billings, Mont.
Edwin J. Bartz.....Champaign, Ill.
R. Stanley Anderson.....Kewanee, Ill.
A. D. Carpenter.....Sauk Center, Minn.
T. M. Shields.....Elgin, Ill.
M. F. Dull.....Chicago
J. N. B.....Atlanta, Ga.
E. B. McDowell.....Kansas City, Mo.
M. Meyle.....New York

No communication not signed by the reader's full name and address will be answered.

HOW A READER REMOVED CARBON

Found Denatured Alcohol Best for This Kind of Work

Sauk Center, Minn.—Editor Motor Age—I have been bothered of late with carbon in my cylinders, and it seemed that kerosene would not do the work satisfactorily. I find that denatured alcohol will do the work the best of anything tried. I took out one of the valves and, taking a piece of cotton cloth I saturated it with the alcohol and rubbed over the head of the valve and allowed it to remain for about 5 minutes, and was most agreeably surprised to find that it would clean the caked carbon in fine style, and leave the valve clean and bright. I filled a bent-nosed oil can with denatured alcohol and then removed the four spark plugs and inserting the bent nose of the can squirted a lot of alcohol into each cylinder, letting it remain for about 1 hour. I then cranked the motor about twenty or thirty times with ignition off, then let it stand again for about 10 minutes. Then I turned on the gasoline and ignition and such a cloud of black smoke you never saw! I

then raced the motor until the smoke from the exhaust was normal, and then I turned on a lot of cylinder oil to lubricate the cylinders where the alcohol had washed it away and my motor was free from carbon.

Alcohol can be had, denatured, for about 75 cents per gallon, and 1 gallon will clear out of a four-cylinder motor every particle of carbon at least 6 or 8 times. The beauty of it is, it is cheap, easily applied, and certain in its results. I would like the experience of others who may have given this a trial prior to mine, and learn how it worked with them. I am most certain denatured alcohol is a real solvent of carbon. It is harmless to the metal of the cylinders. It does not evaporate as quickly as gasoline, but it must be kept in a tight recepticle, as it gradually would evaporate if left in an open vessel. It is much easier to keep than gasoline, as it does not expand so readily under heat, and will not burn as easily. That this alcohol is the foe of carbon there can be no doubt, and hot or cold it works fine on carbon. It must, however, be followed by lubricating oil as the parts cleansed of the carbon and oil would invite dampness which would rust the parts so cleaned.

To those who have fed too much cylinder oil to their motors I suggest a trial at least and see if my position is correct in this matter, and I feel certain they will like the results.—A. D. Carpenter.

CONCERNING ARGO FOOT CONTROL

Lever Operates a Drum Which Makes Different Battery Connections

Chicago—Editor Motor Age—When they say a battery is sulphated what do they mean? How does the Argo foot control shown in Motor Age a few weeks ago regulate the speeds?—M. F. Dull.

1—The production of an electric current by a storage battery is due to chemical action within the battery. This chemical action produces lead sulphate and a number of other compounds. Lead sulphate is a non-conductor of electricity and when it deposits itself on the battery plates and covers them, no current will flow.

2—The foot pedal operates a controller. When the pedal is placed in first speed the controller is turned so that current from 20 cells connected in multiple, is used. For second speed the controller is again turned so that the same twenty cells give their current from a series connection. Third speed uses forty cells connected in multiple and fourth speed forty cells connected in series.

HOW SHALL A CAR BE STOPPED?

Brake Alone Should Not be Used—Release Clutch

Elgin, Ill.—Editor Motor Age—I was driving a car belonging to a friend of mine and when I wished to stop I threw out the clutch and pressed the brake pedal. My friend said that if the car is not to be brought to a full stop only the brake need be pressed. Is this correct.—T. M. Shields.

It is practice with many drivers to apply the brake only, but this results in excessive brake band wear and is not as effective as if the clutch were released and the brake applied. It is reasonable to believe that a car will stop sooner and with less strain on the parts, if the power is taken from the driving members and then the brake applied.

THE BEST GEAR RATIO FOR A CAR

Power of the Motor and Vehicle Weight Considered

Atlanta, Ga.—Editor Motor Age—Can Motor Age give me the specifications of the Masons which ran at Elgin?

2—I believe I can safely say that I am one of the first six-cylinder enthusiasts in this, or any other, country. In fact, I am so much of a crank on the subject that I have never been able to get the notion out of my head that a properly designed six-cylinder racing car can equal and even better the performance of the fours. I would like to have the opinion of Motor Age as well as that of its readers regarding this matter.

3—Are double valves worth the trouble and expense that is necessarily involved in their installation?

4—Is not about 3¾ by 6¾ inches the best bore-stroke ratio possible to obtain for the displacement of 447.3 inches?

5—What should the compression be, how many rings should I have both above and below the pin?

6—What would be the best gear ratio with a cone clutch, four-speed transmission, shaft drive, 36 by 5-inch wheels, and a maximum motor speed of almost 3,000 r.p.m., first for speedway work, second, for road work?

7—What has become of the grand old 24-hour race? Why are these no longer held?—J. N. B.

1—The Mason's specifications for both day's racing at Elgin were given in Motor Age issue of September 4 pages 16 and 17.

2—It is hardly fair to ask whether a four or a six is better, for the question is so broad. A four-cylinder car of a certain cubic capacity may be better than a six of the same capacity and vice-versa. Even with design as nearly alike in both cases, the question is hardly answerable definitely. Carburetion and magnetos present the chief difficulties in sixes for speed work.

3—It is stated that the use of double valves results in greater power for a given motor capacity, but just how much better this type may be over the single-valve type of motor is a question. There are no pleasure cars on the market using the double valve type of motor, and its use in late years has been confined to racing cars. The cost of installation is not obtainable. It certainly results in greater power and speed and where speed is the main feature desired should be worth the trouble.

4—According to some engineers the ratio you mention is good, and according to others, it is not. Most engineers consider a stroke-bore ratio of 1 to 1.45 or 1.5 better for ordinary use.

5—The compression could be anywhere from 50 to 95 pounds and the number of rings to be used is purely one of personal opinion. Too good, wide rings above the pin would do the work, but two above and one below is better except for high-speed work.

6—The proper gear ratio will depend upon the relative weight of the car and power of the motor; for speedway work, between 1.5 to 1 and 2.0 to 1; for road races, between 2.0 to 1 and 2.5 to 1.

7—Manufacturers are not supporting racing contests the way they formerly did and a 24-hour race is such an expensive proposition that few of the drivers are able to finance an entry themselves.

MOON OILING SYSTEM EXPLAINED

Called Circulating Splash Method—Rods Have Scoops

Kansas City, Mo.—Editor Motor Age—Can Motor Age advise us just what is the oiling system used by the Moon Motor Co. in their 1914 cars? We are very anxious to learn just how it works.—E. B. McDowell.

The motor of the Moon car is oiled by the circulating splash system. Each connecting rod has at its end a scoop, S, as shown in Fig. 2. As the rod comes down this scoop dips into a trough, T. The troughs, one under each rod, are fed by a pump P on the side of the crankcase. The overflow from the troughs drop to the bottom of the crankcase R, which acts as a reservoir and this oil is picked up, strained, passed to the pump and then sent to the troughs through the pipe E for recirculation.

Use of Picric Acid

New York—Editor Motor Age—Is it advisable to use a certain percentage of picric acid in the fuel during the winter. Will it hurt the motor?—M. Meyle.

The use of picric acid has been found to injure the motor. It gives more power to the motor, but is harmful to the metal.

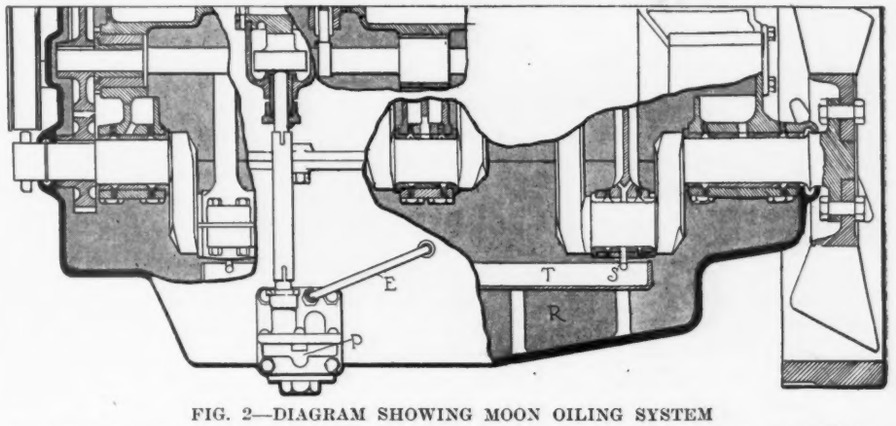


FIG. 2—DIAGRAM SHOWING MOON OILING SYSTEM

The scoops S on the bottom of the connecting rods dip into the troughs T and pick up the lubricant. The overflow from the troughs drops to the reservoir R

Studebakers Appear in Two Models, a Light Six and a Four

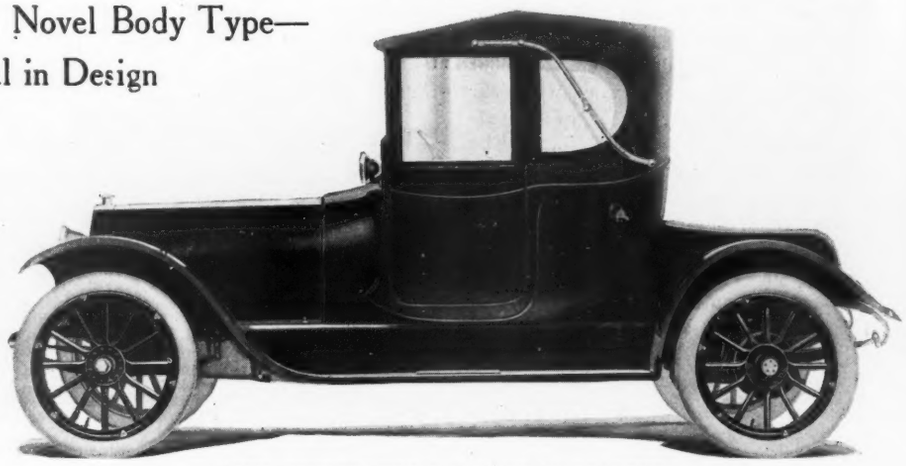
Convertible Landau-Roadster a Novel Body Type— Two Chassis Identical in Design

STUDEBAKER has returned to limiting its production to two chassis models instead of the four different models produced by the Studebaker Corp. this year. The new cars for 1914 will appear as a four and a six, the former being quite similar in size and general design to the models 25 and 35 of 1913 and the six retaining most of the characteristics of dimensions and arrangements of this year's six-cylinder production.

Both the four and the six retain the same cylinder dimensions as did their prototype of 1913 and the cylinder dimensions in both cars are the same, being 3⅓ inches bore and 5 inches stroke. In other respects, also, the cars are similar in design and detail, the chief differences being the two added cylinders of the six and the more liberal proportions due to its greater capacity. The four-cylinder car carries a five-passenger touring body and a type called by the factory the landau-roadster. This is a convertible body of novel features which will be enlarged upon later. The six-cylinder car has a six or seven-passenger body and a sedan body as well as the landau-roadster type. The four touring car is listed at $1,050, a reduction of $240 from the price of the 35 of this year, but are increased on the 25. The six lists at $1,575 as a touring car, which is practically the same as this year.

Left Drive and Dash Tank

To a great extent the changes in detail apply with equal force to both models. Most prominent, perhaps, is the inauguration of left drive and center control. The importance of this change in the case of a manufacturer who has sold more than 120,000 cars of the right control and steering type is especially noteworthy as an indication of the popular demand. Also Studebaker has abandoned the conventional plan of placing the gasoline tank of the touring models under the front seat and has installed it under the cowl of the dash, securing a short and nearly vertical feed to the carbureter while allowing the seats to be lowered and made more comfortable.



NEW STUDEBAKER SIX LANDAU ROADSTER

This is a novel convertible body which can be transformed quickly from the closed type illustrated into an open roadster. This is fitted to both chassis

FEATURES OF THE NEW STUDEBAKERS

Two chassis types—a four and a six

Three body styles—touring, landau-roadster and sedan

Tapering hoods, streamline bodies, full U doors

Left drive and center control throughout

Four motor, 3½ by 5 inches; six, 3½ by 5 inches

Two-unit electrical equipment on all cars

Ignition from main storage battery, through coil and shaft-driven Remy distributor

Floating axles on both models

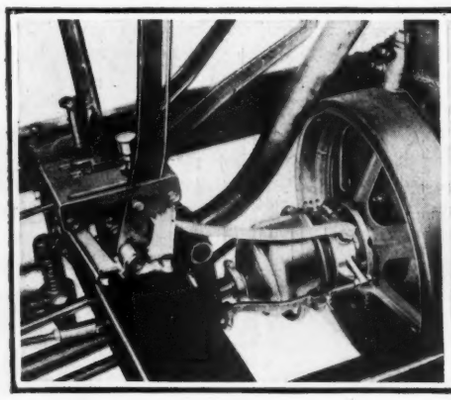
Gasoline tank under cowl

Underslung elliptic rear springs on four

Prices: Touring cars, $1,050 *and* $1,575; *landau roadsters,* $1,200 *and* $1,950; *six sedan,* $2,250

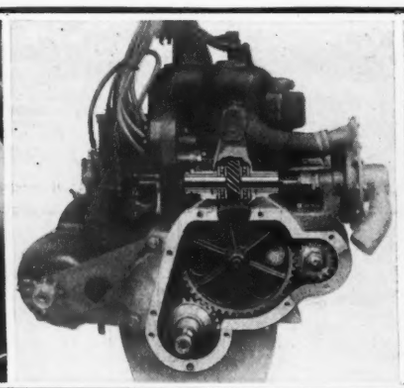
New Electric System

Last year the Studebaker employed a single-unit system for starting and lighting, connected with the drive shaft by means of a silent chain. This plan has been modified in the new cars, a two-unit system being employed. The generator is placed on the left of the motor and drives noiselessly by a shaft and pinion in mesh with the camshaft gear. The electric motor is on the right side, connected to the drive shaft by a roller clutch chain and sprockets. A simple pinion gear reduction encased within the unit, together with the chain sprockets, results in a gear ratio of about 20 to 1. Storage is in a 6-volt Willard battery. Wiring is enclosed in flexible steel cables. The cranking is engaged through a plunger under the heel of the driver. An indicator on the dash shows the direction of current flow. The battery charges readily when the motor is



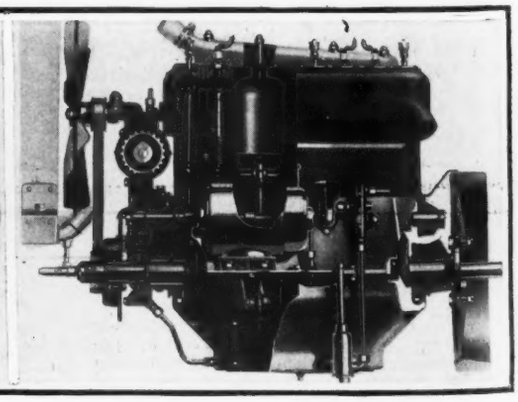
NOVEL CLUTCH LUBRICATION

Studebaker clutches are lubricated by a grease cup on the H plate through a flexible tube of large diameter



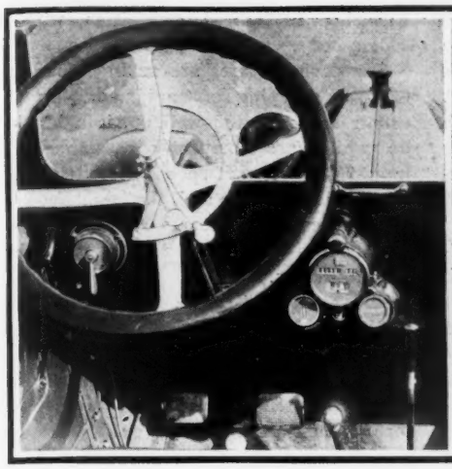
FRONT END OF STUDEBAKER MOTOR

The arrangement is the same on all models. The transverse shaft with helical gear drives the distributor and pump



SECTIONAL VIEW OF STUDEBAKER FOUR MOTOR

A cut through the valve side of the motor showing the arrangement of the various parts. Note the drive of the transverse shaft



STUDEBAKER DASH AND CONTROL FEATURES

Showing the grouping in one bracket of the speedometer, electric tell-tale and sight feed

TONNEAU DETAILS OF THE SIX

The auxiliary seats fold into recesses in back of the front seat. The seats lift into position without clamps

revolving at a speed equal to 10 miles an hour on high gear and the charging rate reaches its maximum at 20 miles an hour. One great advantage claimed for the system is its silence. There are no clashing gears and even the hum of a chain is missing, as the electric motor and its connection become stationary as soon as the cranking operation is ended. Even distribution of weight also is secured by the balanced quality of the two-unit device. The complete system, incidentally, weighs considerably less than the electrical system used last year. The generating and cranking parts of the electrical device are made by the Wagner company at St. Louis, Mo., especially for Studebaker.

No Magneto on Studebakers

Studebaker makes use of the electric system for ignition. The current from the battery passes through a coil placed at the front under the hood and is timed by a Remy distributor which is driven by a cross-shaft opposite the pump.

Instead of turning on the cast iron bearings of the piston bosses, wrist pins now turn on bronze bushings, making possible the adjustment and replacement without renewal of the piston. The pistons themselves are flat-topped instead of crowned as last year, are much lighter and are equipped with but 3 rings, factory tests having shown that this number is ample for conservation of the compression while the change at the same time is said to reduce the friction within the cylinder fully 25 per cent.

Motors in Detail

The motors are of the long-stroke, small-bore type, block castings. A Schebler carbureter, along the lines of the Indianapolis firm's model R, but changed somewhat for Studebaker requirement, is standard equipment. The position of the gasoline tank allows this carbureter to be mounted well up alongside the motor where an abundant supply of warm air always is available. The intake manifold is much shorter than that on any prior Studebaker model, and bolts to the block casting. Wide range of carbureter adjustment is permitted from the dash.

The clutch shows several improvements and is larger in both models. Instead of bearing simply on the shoulder it now moves by engagement of two grooves and rings. Lubrication for the clutch is supplied from a grease cup on the H plate communicated with the bearing by means of a flexible steel tube.

Large steering wheels on the six are new features. The centralizing of the control levers also simplifies to a marked degree the details of the brake and gear-shifting mechanism. In accordance with this change, making entrance and egress equally easy from either side, the Studebaker designers have left both running boards entirely free of equipment, providing a rack for an extra rim in the rear and placing the battery box under the front seat. The clean design of the running boards is emphasized in both cars by the presence of aluminum treads at the entrances of the doors.

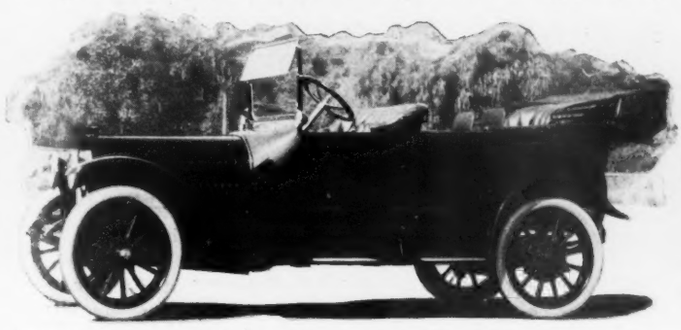
The effort toward increased efficiency also is noted in a liberal use of Timken roller bearings which, in several cases, have displaced bearings of other types. There are two of these bearings in each front hub, and one has been added on each side of the differential, the latter making possible the adjustment of the ring gear and pinion to a great degree of accuracy. A large Hyatt bearing has replaced the plain bronze formerly used between the forward main driving shaft and the pinion shaft in the transmission.

The six retains many of the prominent characteristics of the former Studebaker six-cylinder car. The cylinders are cast in block and are unchanged in dimensions, being 3½ by 5 inches bore and stroke; the wheelbase remains at 121 inches; crowned fenders again are a feature, and the transmission system has been altered merely by the addition of several details tending to reduce friction and facilitate adjustment. The body has, however, been widened at the rear and now includes ample seven-passenger capacity, the auxiliary tonneau seats folding into a recess in the back of the front seat, instead of pivoting into place against the sides of the compartment. By the manufacture of this model on a large scale the Studebakers are enabled to market it at $1,575, in touring form.

The six of course has a larger and different type of radiator, different shafting, characteristic timing and other features. The same similarity holds good for other parts of the chassis, including a marked standardization of nuts, bolts, washers and other small parts.

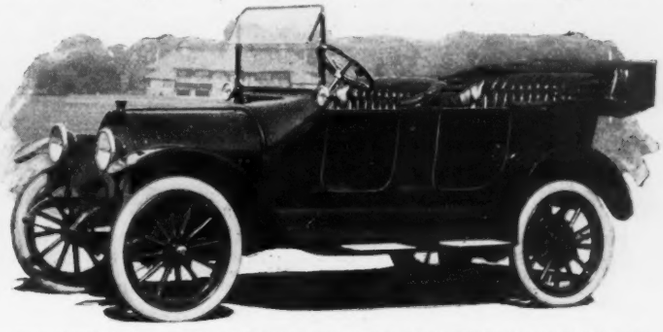
The Four-Cylinder Car

The four is virtually a new car, though of characteristic Studebaker design throughout. It has a wheelbase of 108 inches, is equipped with a two-unit electrical system, has a floating rear axle—change from on the semi-float type em-



STUDEBAKER SEVEN-PASSENGER, SIX-CYLINDER TOURING CAR

This model has a 121-inch wheelbase and with full equipment including electric cranking and lighting system is offered at $1,575



STUDEBAKER FIVE-PASSENGER, FOUR-CYLINDER TOURING CAR

Left drive center control and floating rear axle are features of this new model, which sells for $1,050

ployed on the Studebaker 25—has the gearset incorporated with it—is fitted with 32-inch wheels. The motor is cast in block like that of all Studebaker cars for the past 2 years. Its general design is, wherever practicable, the same as the six in all essentials.

This car shows an important change in suspension, the rear springs being elliptic and attached to the lower side of the axle housing—an arrangement making possible a great deal of additional dip and permitting the use of a far more flexible spring than is possible with the conventional equipment. At the same time, the underslung suspension makes it unnecessary to raise the tonneau above the level of the front seat, to provide for the depression caused when it is carrying a load.

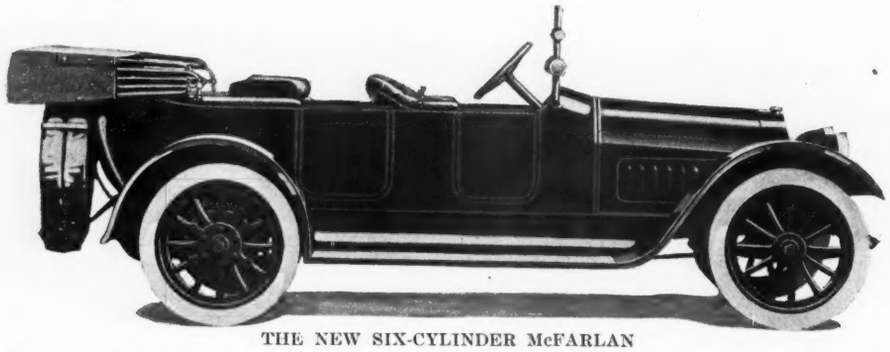
In addition to the touring bodies with which the cars is equipped in standard form both the four and the six is marketed with a body of the convertible type, termed the landau-roadster. This body is a copy of a famous design by Salmon & Sons, the English body builders. With top down and windows lowered, the car is merely a handsome roadster of conventional type. In cold or inclement weather, however, the top can be raised, windows slipped into place, and, with a few adjustments, the car becomes a veritable coupe, impervious to storm.

Several of these cars have been in use during the past season by the Studebaker officials at South Bend and Detroit. The six landau-roadster is of full three-passenger capacity and shows one of the finest finished interiors which Studebaker has ever built. The four landau-roadster body is slightly smaller but is built on identical lines. The six chassis also is furnished in limited quantities with a sedan body.

The dash features are an ingenious and original grouping of equipment. In the center and mounted well up, is a bracket on which are compactly assembled the large-figure Stewart speedometer, the electric indicator dial and the sight-feed of the lubrication system. The dash lamp, attached to the top of the fixture, illumines all three.

The equipment includes Goodrich tires on Booth demountable and quick-detachable rims; Stewart speedomoter; electric horn, taking current from the storage battery; Gray & Davis lamps; silk-mohair tops; jiffy-type curtains; extra rim and carrier mounted in the rear; windshield adjustable to ventilation and rain vision, and a complete set of tools, several of which are made especially for these cars.

McFarlan Six Production Concentrated on Single Chassis



THE NEW SIX-CYLINDER McFARLAN

The graceful lines are well brought out by the sloping hood, clean running boards, and by the placing of the tires in the rear of the chassis

BASIC principles of construction have been altered not at all in the new series of McFarland cars, this car being added last year to the growing number of those whose makers have foresworn the yearly model designation. Nevertheless, McFarland cars are brought out as the improved or new series at about the time the yearly model makers announce their new yearly models, so that referring to the following car by year number rather than series number gives a basis of comparison that would be more easily understood by the average reader. Actually, the new McFarland sixes are known as the series T and a cursory glance at the 1913 and 1914 chassis side by side would show little alteration except for the new location of the steering wheel, which has been switched from the right to the left side, the control levers remaining in the center.

Series T, as it is now called, is in general design the same as the model T of the 1913 series. The present model T motor, a block, six-cylinder casting, with a 4-inch bore and 6-inch stroke being practically unchanged. The series M and series S of 1913 have been discontinued. Series T was the new model of 1913 and was the feature of this year's line. As continued for the new season, this chassis is fitted with a

FEATURES OF McFARLAN SIX

One chassis with seven body types
Block-cast six-cylinder motor 4 by 6 inches
Four inches longer wheelbase
Three-fourths elliptic rear springs, underslung
Mea magneto
Left drive
New four-passenger coupe
All-metal air pump
Larger air tank
Engine-speed electric lighting dynamo
No dash lights
Sloping hood
All bodies larger
Collins curtains
Ball-bearing steering knuckles

motor of the T-head type with a four-bearing crankshaft. The valve mechanisms are inclosed in the cylinder block and covered by removable aluminum plates. The inlet passages are internal of the engine casting. A Stromberg water-jacketed, double-jet carbureter is used and a cranking system of the pneumatic type employing an air pump ,tank, distributer and individual leads to the cylinders.

Other carried-over features of design include the disk-in oil-clutch, the three-speed selective gearset which is incorporated with the floating rear axle, three-quarter elliptic rear springs and splash motor lubrication.

Among the changes to be noticed in comparison of the dimensions and other features of the new series is the increase of 4 inches in the wheelbase, making the latter dimension 128 inches for 1914, and the underslinging of the three-quarter elliptic rear springs. It is claimed for the underslung construction that it prevents side-lash of the body of the car and thus eliminates one of the greatest tire strains.

The rear spring hangers are unique in design. The front one is part of the casting that is riveted on the frame to serve as a bearing for the brake cross shafts, and the top one practically is formed by an integral extension of a large gusset plate which extends clear across the rear of the frame. Truffault-Hartford shock absorbers are part of the equipment of each car.

Accessible Brake Adjustments

Next to the steering wheel and springs the brake layout of the new car would come in for comment. The present layout is such that adjustments of the brake rods may be made while standing by the side of the car, and the rods themselves are very short and consequently not likely to break. A convenient little door in the splash guard near the rear fender allows access to the brake-rod adjustments and also to the front shackles of the rear spring. Inside the brake drums another change has been made in the design of the adjusting toggles and links with a view to securing even pressure all around the brake drum from the bands.

Several less notable but not unimpor-

tant changes and improvements are apparent on the new chassis. One is the new air pump for the starting system and the other electric lighting generator. The present air pump which is claimed to be fool-proof and requires no attention, is all metal, and the little pistons have metal rings on them as in the pistons of a motor. Also it has a forged crankshaft and connecting rods that are made of bearing bronze. The chief point in its favor is that it uses the same cylinder oil that is used in the motor, and it is oiled automatically by means of the sight-feed pump on the motor.

Electric Lighting Refined

Electric lighting is taken care of by a Vesta generator and battery. The electric generator sets just ahead of the air pump, and in line with it. On the older cars the generator was smaller, and to make the required output had to be geared up. The present generator is a big, husky instrument that runs at crankshaft speed and is driven direct from the water-pump shaft. The mechanical governor on the old generator has been done away with, and now the required resistance is taken care of by a magnetic governor which never requires lubrication or attention. The air pump does not run all the time, so there is a ball clutch on the shaft between the generator and air pump by means of which the air pump is thrown into or out of gear. If the generator has to come off either for work on the generator itself, or to get at the insides of the water pump, in the close quarters in which the mechanic would have to work some disalignment would not be an impossibility. So the generator and the air pump are bolted to a single big bracket which comes out with both instruments on it, and then either of them can then be taken off and put back on the bench.

The radiator is hung on trunnions instead of being bolted to the front cross member of the frame. The new steering knuckles have ball bearings in them and the car steers much easier. The new magneto is a Mea. The new universal is a Spicer. The new air tank is 10 by 40 inches, and will hold nearly double the volume of air that the old one would, and the new gasoline tank is a cylindrical, seamless steel affair.

Seven brand new bodies, ranging from a two-passenger roadster to a seven-passenger berline may be fitted on the new chassis. The new windshield fits the cowl closely and the top straps are attached to it instead of to the front end of the frame. The new car has Collin's 1-minute curtains, and up-to-date sloping hood, no dash lights, but double filament headlights, and all the car operating paraphernalia on a drop board from the cowl within easy reach of the driver. A novel feature of equipment is the option at a slight extra cost of the Gray pneumatic gearshift.

Prices of McFarland cars remain in general practically the same as those of the 1913 series T productions. The two- four- and five-passenger open cars are listed at $2,590, an increase of $90 in the list price. The six- and seven-passenger touring cars are the same figure which, however, is the same as the 1913 price. The coupe remains at $3,200 and the limousine shows an increase of $300, making it now $4,000.

ELECTRIC CONVENTION PLANS

Chicago, Oct. 22—The fourth annual convention of the Electric Vehicle Association of America will be held at the Hotel La-Salle, Chicago, October 27 and 28. Morning and afternoon sessions are scheduled for each day.

The convention will open at 10 o'clock Monday morning which will be featured by a special report of the committee on rates and charging stations by John F. Gilchrist, chairman. In the afternoon reports from the different sections will be given by Homer E. Niesz, of Chicago, J. A. Hunnewell, of the New England division, Harvey Robinson, of the New York Electric Vehicle Association and Day Baker, of the Electric Motor Car Club, of Boston. In addition the following addresses will be delivered: "Traffic Problems and the Automobile," by Dr. E. E. Pratt, manager of the industrial bureau of the Merchants' Association of New York; "The Merchant, the Central Station and the Electric Truck," by F. Nelson Carle, of the General Vehicle Co., and "Co-operation Between Electric Vehicle Manufacturers and the Central Stations," by E. L. Callahan, vice-chairman of the N. E. L. A. commercial section.

The program for Tuesday morning includes the following addresses: "Charging of Storage Batteries in Unattended Garages," by M. R. Berry, of the Electric Products Co.; "Electric Vehicle Salesmanship," by George H. Kelly and E. J. Bartlett, of the Baker Motor Vehicle Co.; "The Electric Vehicle in Department Store Service," by C. A. Duerr, of Gimbel Bros., Milwaukee, and David F. Tobias, of the United Electric Light and Power Co.; and "Recent Developments in the Lead Battery for Electric Vehicles," by Bruce Ford, of the Electric Storage Battery Co.

The addresses and speakers of the afternoon session are: "Electric Commercial Vehicle Tires," by F. E. Whitney, of the Commercial Truck Co., of America, and "How to Make the Business Healthy," by Ralph Temple, of the Temple Garage, Chicago.

A beef steak dinner will be tendered to members and guests Monday evening at the Hotel La Salle, after which electric cars will be furnished for a trip through the south side parks and boulevards and a visit to several modern electric vehicle garages. The return trip will terminate at the Hotel La Salle where a supper and cabaret show will be given. The Commonwealth Edison Co. will entertain members and invited guests at luncheon Tuesday.

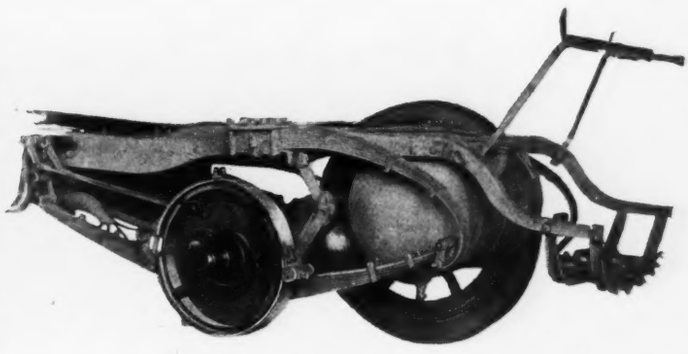
Manufacturers of vehicles and accessories will have headquarters and exhibits in rooms on the eighteenth floor of the hotel.

GERMANY MAY BUILD SPEEDWAY

Indianapolis, Ind., Oct. 20—The Indianapolis motor speedway may soon have a counterpart in Germany, if the plans of Adam Opel, who manufactures the Opel car at Ruesselsheim, are realized. Speedway officials have been called on to furnish drawings and data of their track, it being the evident intention of the Teuton, piece for piece, to duplicate the American enterprise.

RIGHT SIDE OF NEW McFARLAN SIX MOTOR

Note that the intake manifold is very short. The pipes directly below the spark plugs on the cylinder casting are part of the air cooling system



McFARLAN SIX REAR SUSPENSION

The three-quarter elliptic springs are underslung. The gasoline tank support is novel. This tank is made of seamless steel. The tire irons are of a new type

New Headlight Glare-Removers

Chicago's Recent Ordinance Brings Out Novel Device for Shading Lamps

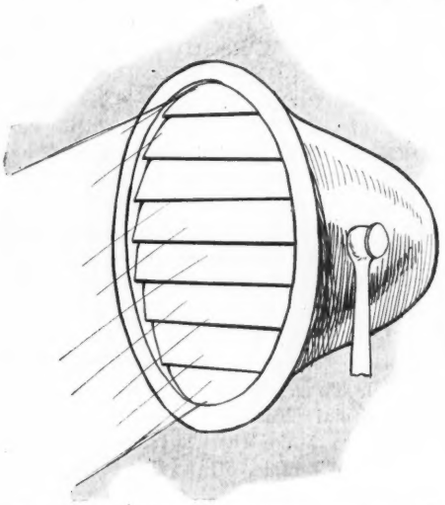


FIG. 1—LIGHT DEFLECTOR OF GLASS PRISMS FOR HEADIGHTS

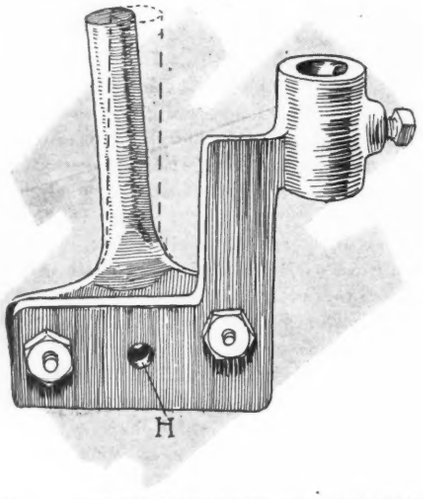


FIG. 2—TILTING BRACKET FOR GLARING HEADLIGHTS

PROGRESS still is being made in developing non-glaring headlights for Chicago and new ideas are being proposed almost daily to gain the double object of getting rid of the headlight glare and still keep for the car owner a good driving light for the coalpit darkness of some of Chicago's streets. Alsa there is an attempt to produce a device which will give sufficient driving light for both country and city without the glare. This is a difficult undertaking.

Policeman Must Recognize Them

These devices must be such that the ordinary policeman can understand their operation and know whether the vehicle complies with the law or not without danger of there being any doubt of proof on his side if he arrest an offender.

Fig. 4 shows a very promising device, an attachment to the lamp bracket allowing the lamp to be placed in two positions and two only. The one throws the light directly ahead as ordinarily, this being when the lamp bracket is in the position shown dotted in Fig. 2. By changing a small bolt to another hole the bracket takes the position shown and the light is turned toward the ground, the angle of tip being determined by the location of the hole in the bracket attachment. This can be made standard.

Glass Prisms Used

Fig. 3 shows a device for obtaining the same effect by means of a prismatic glass to take the place of the usual front lamp glass. This has horizontal prisms cast in the face, so that the light coming through is deflected down to the ground as in Fig. 1. This gives almost identically the the same effect as the tipped bracket and makes a very neat arrangement. Neither of these devices has been passed upon officially, however.

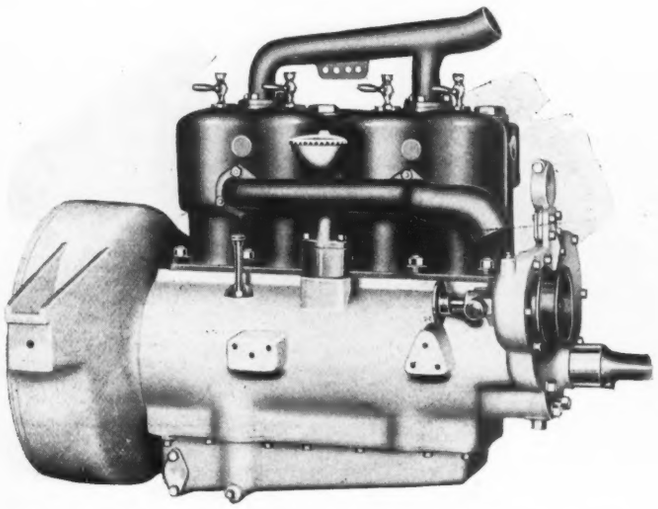
A new test for defining a glaring light has been suggested, which has a basis of interest at least. This is to look steadily at a headlight for a number of seconds, then to look off at a black surface or better into the dark. If a spot is seen, left on the retina from looking at the light then the headlight is glaring, if there is no spot and one can see objects at once then the headlight is not glaring. This is a doubtful test but has its interest. Definite action on the headlight situation will be had within a few days.

TWO NEW HAZARD MOTORS

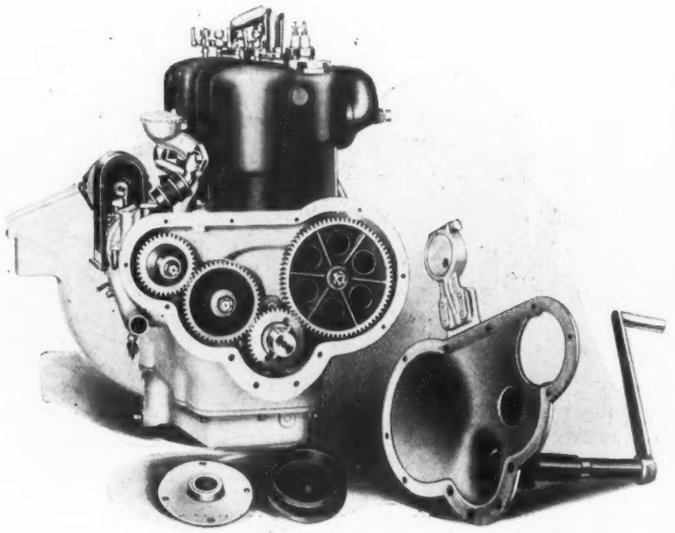
Two new sizes have just been added to the Ergon line of four-cylinder motors, manufactured by the Hazard Motor Mfg. Co., Rochester, N. Y. In general appearance both models are the same. They are known as the models C and CX, the former with a bore and stroke of 3¾ by 3½ inches and the latter 4 by 4½, rated at 25 and 30 horsepower, respectively. Cylinders are of L-head construction and cast in pairs and the arrangement of the parts around the cylinders, such as to make a clean-looking and accessible motor. The illustrations of the side and timing gear ends, shown on this page, bring out the motor symmetry very well.

Lubrication is by splash with an auxiliary oil pump. Oil is pumped from a reservoir in the crankcase and passed through a strainer and thence to troughs below the connecting rods. Scoops on the rod ends pick up the oil and carry it to the moving parts.

Two types of water manifolds are being supplied, one for thermo-syphon and the other for pump cooling. Facilities for pump and magneto installation are on the right side of the motor and these accessories may be driven by shaft from the countershaft gear as shown in one of the illustrations on this page. This also shows the helical timing gears. The crankcase is of the barrel type and is made of aluminum alloy.



EXHAUST SIDE OF NEW ERGON MOTOR SHOWING CLEAN LINES AND LOW EXHAUST PIPE



FRONT VIEW OF ERGON MOTOR SHOWING HELICAL TIMING GEARS

The motor is of the three-point suspension type, two projecting arms in the rear being cast integral with the flywheel housing. The front is a trunnion support. These motors are designed for use in either pleasure or commercial vehicles.

NEW MONARCH ANNOUNCED

Announcement of a new Monarch car, built by the Monarch Motor Car Co., Detroit, of which R. C. Hupp is president, is made. Its several distinctive features are along European lines, having a stream-line body with a sloping hood of the Renault type. The gasoline tank is under the cowl at the front of the dash. The motor designed especially for the car along European lines is of the long-stroke, small-bore type and light in weight. It will develop full 25 horsepower and has four cylinders cast in pairs, bore 3 3/16 inches, stroke 5 inches. The cooling system is of the thermo-syphon type. The carbureter is on the right side of the motor with a very short intake pipe without pockets. The feed pipe from the gasoline tank to the carbureter also is very short, due to the location of the gasoline tank in the dash. The timing gears at the front of the power plant of this new model of Monarch are spirally cut and are accessible on removal of the gear cover in the conventional way.

Lubrication is of the force-feed type.

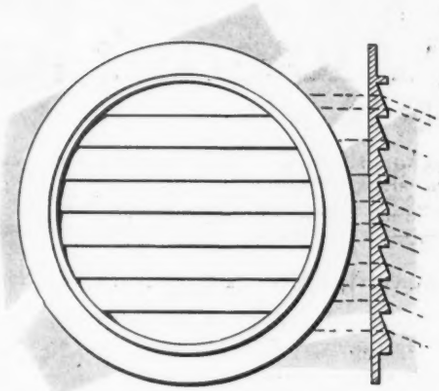


FIG. 3—HOW THE PRISM DEFLECTS THE LIGHT RAYS

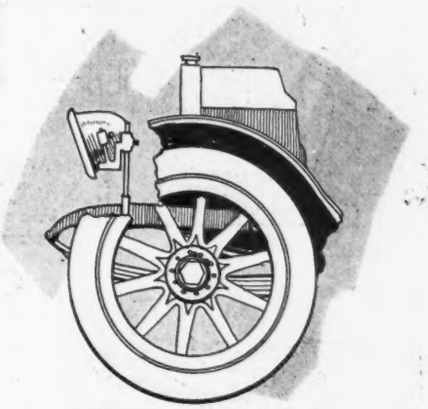


FIG. 4—TILTING SOCKET IN PLACE ON CAR

The transmission system includes a cone clutch, three-speed gearset, and double universal drive to the rear axle. The gearset is carried on tubes with the motor, and is controlled by a centrally located lever. The gearset cover also carries control lever and hand brake. The propeller shaft is not inclosed—two double radius rods preserve the alignment of the rear axle, which is of the semi-floating variety with bevel drive, the ratio is 4 1/3 to 1.

External contracting and internal expanding brakes are mounted on the rear hubs and have a diameter of 12 inches and a width of 2 inches, giving ample surface for any emergencies.

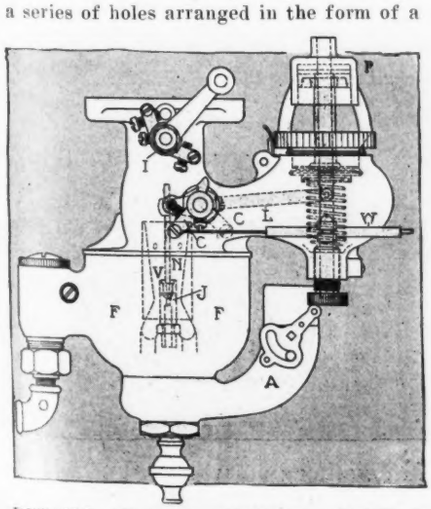
The car has left-hand drive, center control, with electric starting and lighting system. The steering wheel is 18 inches in diameter. Other features include magneto ignition, 32 by 3½ tires, quick-detachable rims, and wire wheels. The equipment includes windshield, extension top with Jiffy curtains, electric lamps, Jones speedometer, tools, repair kit, pump and jack. The car sells for $1,050, full five-passenger body on a 110-inch wheelbase chassis.

New Schebler Model R Carbureter Has Novel Features

Design Intended to Give Better Mixtures at All Speeds

WHEELER & SCHEBLER have brought out a new single jet carbureter under the name of model R. It is a concentric venturi type with a spring auxiliary air valve that has several new features as compared to previous Schebler designs.

Gasoline enters at O in the sketch through the customary valve arrangement into the float chamber F, rising to a level of about 1/16-inch below the top of the jet opening J. Entrance of gasoline from the float chamber to the central jet passage is through a series of holes arranged in the form of a ring around the bottom of the chamber.



DETAILS OF NEW SCHEBLER MODEL R CARBURETER

The primary air passage is through the center of the carbureter by way of the venturi V around the jet and thence to the intake passage I. The air intake pipe A, is arranged to take a flexible hot-air tube.

To secure the proper mixture at low speed the customary needle valve N, is used. The arrangements by which this jet needle valve is controlled, however, are distinctive. The adjustment for this jet is made by means of a Bowden wire W from the steering column. This wire is connected with a bell crank lever C on the side of the carbureter, which rises and lowers the needle valve when it is turned.

The Bowden wire is so arranged that when the lever on the steering column controlling it is in its central position on the steering column the carbureter is in its correct position for low speed. The running position of the carbureter is when the boss on the lever is against the stop. The lever on the steering column should then register at the words Lean, or Air.

If climatic conditions change and the mixture needs to be richer or leaner, the adjustment can be made from the seat by giving a little more or less gas as required. All the other features and the entire operation of the carbureter at higher speeds, are automatic.

There are two types of air valve fitted on the model R. The regular stock R on the open market has a spring-controlled air valve with its movement regulated by a dash pot P. The dash pot is formed by a piston on the end of the air valve stem which rises and lowers it with the movements of the air valve. The other model R, is that used on the Overland car and had no dash pot.

Principle is Old

The principle of the valve is the same as that used on previous models and consists of furnishing the required additional air when the motor speed increases. This is done automatically by having the suction of the motor act on the air valve, pulling it from its seat against the tension of the spring. The adjustment consists in increasing or decreasing the tension on this spring.

When the air valve on this carbureter opens it lifts the needle valve with it, to a degree which has been worked out in the factory. In lifting the needle valve by an interconnected lever L the lever C controlled by the Bowden wire does not move. The connection between the Bowden wire device and the automatic lift is similar to the relation that exists between the hand throttle lever and the accelerator pedal, the latter merely furnishing the set or minimum position.

The Motorist's Kindergarten

EDITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car.

Construction of Electric Vehicle

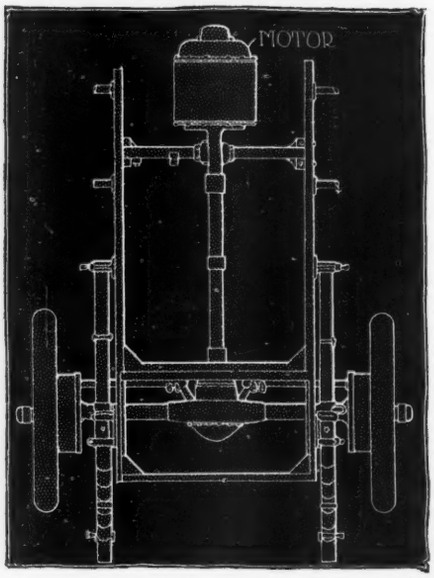


FIG. 88—DRIVE OF OHIO ELECTRIC

Showing how the motor is placed lengthwise and the armature shaft driving the shaft of the car. Sometimes the drive from the motor is made through reduction gearing or silent chain to the drive shaft of the vehicle

AN ELECTRIC vehicle in its operation is similar to the electric street car, the difference being that in the latter current is unlimited and is taken from a wire overhead, or a third rail to operate a motor, while in the electric carriage the available supply of electricity is in the form of storage batteries and the supply limited.

The Electric Motor

An electric motor is a machine which will give mechanical or motion energy for electrical energy or current. An electric motor is nothing more than a bundle of wire wound on an iron bar suspended between the poles of a magnet, or in other words, placed in a magnetic field. It is known, but no one knows why, that if a ball of wire wound on an iron core, as it is called, is suspended in a magnetic field and then current passed through the coil, the coil will turn around. Thus if a current of electricity is passed through the armature, or coil of wire, of a motor the armature turns around and since it revolves it is producing mechanical or motion energy. That it turns around, is a fact discovered by some far-seeing man some time ago. He did not know why it turned. Just how the mechanical energy of the motor is utilized in the electric vehicle will be taken up later, but we are concerned now with the method of getting the current for the motor and carrying this current around on the car, instead of taking it from a wire as the street car does.

There is not a great difference in construction between an electric motor as used on vehicles and the magneto used for ignition purposes on pleasure cars. In the magneto the field or magnetic influence is a permanent magnet, whereas in the motor the magnet is not permanent. The field magnets of a motor have windings of wire around them and some of the battery current is passed through these windings. When this is done a magnetic field is produced and it is within this magnetic field which the armature operates.

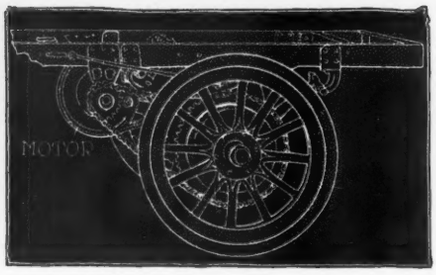


FIG. 89—A COMMON FORM OF CHAIN-DRIVE ELECTRIC

The motor is placed across the frame and extensions of the armature shaft having sprockets attached. These sprockets are connected by chains to other sprockets on the rear wheels

Electricity for vehicles is obtained from storage batteries, or chemical producers. It is known that the result of chemical action produces among other things—electricity. In the ordinary storage battery there are a number of plates made of lead. These plates are in the form of grids and the spaces are filled with oxides of lead. Half the plates are connected together to form the positive electrode and the other half connected to form the negative. In some instances the active material or lead oxides of the positive and negative plates differ, but not essentially.

Action in the Battery

The plates are suspended in a jar containing sulphuric acid. The action which takes place in the battery results in the formation of lead sulphate. When a battery is new there is no lead sulphate in it, but as the action of the battery continues this sulphate is formed chemically and deposited on the plates. Should the plates of a battery be covered with sulphate the chemical action ceases, because lead sulphate is a non-conductor of electricity. Hence when a battery is dead it means that lead sulphate has been formed on the plates.

When a battery is alive it means that there is chemical action inside which is producing electricity and lead sulphate, but as long as the sulphate does not cover the plates entirely electricity is being generated. The batteries of an electric vehicle may be carried either in the front or rear of the chassis, or it may be divided, as shown in Fig. 91, in which case it helps to distribute the weight over the wheels evenly.

So far we have taken up two main parts of the electric vehicle, viz.: The source of current and the motor which uses the current. The next part for discussion is the controller. This is a mass

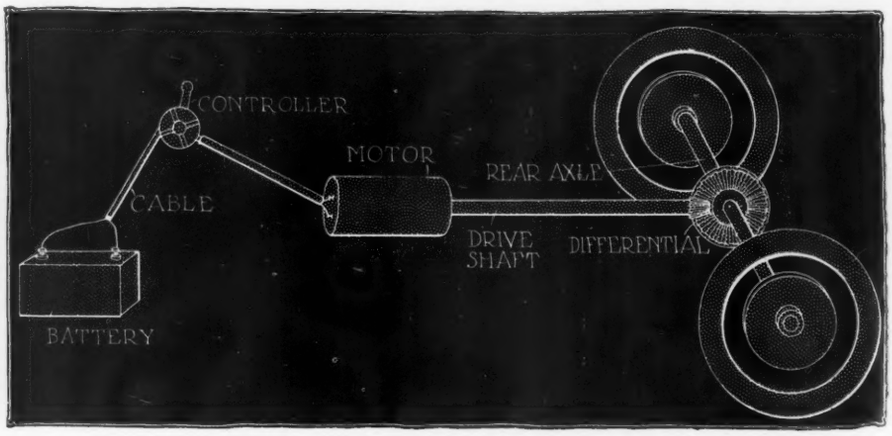


FIG. 90—A SIMPLE ELECTRIC VEHICLE PLAN

The storage battery is the source of electricity. The current from this is led to the controller and from this device it is passed to the electric motor which is directly or indirectly connected with the rear axle

of switches actuated by a lever on the side of the car, or by a pedal, as is the case in the Argo electric, and which controls the amount of current which is led to the motor.

Getting Different Speeds

To divert slightly: If a motor is designed to operate at 80 volts pressure and at this pressure it turns at 1,000 r. p. m., and if the voltage is reduced one-half, then the speed of the motor is reduced proportionally. Hence, in order to get different car speeds, we must obtain different motor speeds. To obtain the latter, the motor is operated at various voltages, and to get the different voltages, a controller is used. In some instances the batteries of a car are so connected that one position of the controller will cause to become operative only a few of the cells of the battery. When all of the cells are in use then the controller is wide open and the motor is being operated at its full capacity, but if the controller is moved to a lower speed, some of the batteries are cut out and hence the voltage reduced. With reduced voltage the motor runs slower. Thus the controller, one type of which is illustrated in Fig. 93, is really a voltage controller. In one car of forty cells first speed uses 20 cells connected in multiple, second speed the same cells in series, third speed the 40 cells in multiple, and fourth speed the 40 cells connected in series.

Methods of Control

The controller with the various switches is not the only method which may be used for making the electric vehicle go fast and slow. If resistance is inserted in the battery circuit, the voltage will be cut down. That is if the total battery current is 80 volts and suitable resistance is inserted in the line the voltage may be cut down to 40, but this method has fallen into disuse except for low-speed work, because the drain on the battery was so great as to require frequent recharging. Another method of control consists in changing the connections of the motor windings, but the method of doing this is rather complicated. Essentially it consists in connecting the field coils in multiple for low-speed work and in series for high-speed work.

We have now taken up the source of current for the electric vehicle; how the current goes through a controller and thence to the motor.

There are many methods of transmitting the power of the motor to the road wheels, the three most important and those in greatest use today being by direct shaft, by side chains and by connecting the motor and rear axle directly by gears.

In the shaft drive, which is used on the majority of pleasure vehicles, the motor takes the position shown in Fig. 88 in which the armature shaft is connected with the drive shaft, usually through a universal. In the double chain drive, shown in Fig. 89, the motor is placed transversally across the frame and the armature shaft is extended and at its ends are

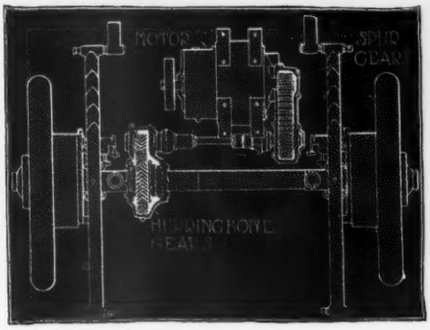


FIG. 92—DIRECT SHAFT DRIVE OF THE WAVERLEY ELECTRIC

Here the battery power is passed to a motor, the armature shaft of which has a spur gear at its end. This spur gear drives a shaft which is directly connected with the rear axle through herringbone gears

placed gears. The side chains operate on these gears. The direct motor-to-rear-axle drive is used by a few manufacturers and one of this type is illustrated in Fig. 92. Here the motor armature shaft has at its end a spur gear and this drives another spur on a shaft parallel to the armature shaft.

The latter shaft, as will be noted, has at its end a gear known as a herringbone, and this is in mesh with another such gear on the rear axle. This type is known as a spur and herringbone reduction.

There are other types of gears used in driving electric vehicles just as there are various types for pleasure cars. The worm has come into use of late and the spur gear has some admirers.

An Electric With a Gearset

In one instance, the Church-Field, a two-speed planetary gearset is used, such a type of gearset being employed on Ford cars. The gearset does not eliminate the controller, but is used to start the vehicle without a jerk and also to negotiate steep hills, by dropping to the low gear. It is stated also that the car is easy to handle in traffic by the use of the gearset.

Steering the electric is accomplished either by a horizontal lever or by the conventional wheel. Both of these methods are in use today. In a number of makers, however, which employ the lever steer, the driver may sit in either the front or the rear of the car and perform the operations of controlling and steering. This is known as the combination drive. In other types the drive is done from the front only and in others from the rear only. The former is known as the foredrive electric and the latter as the rear drive.

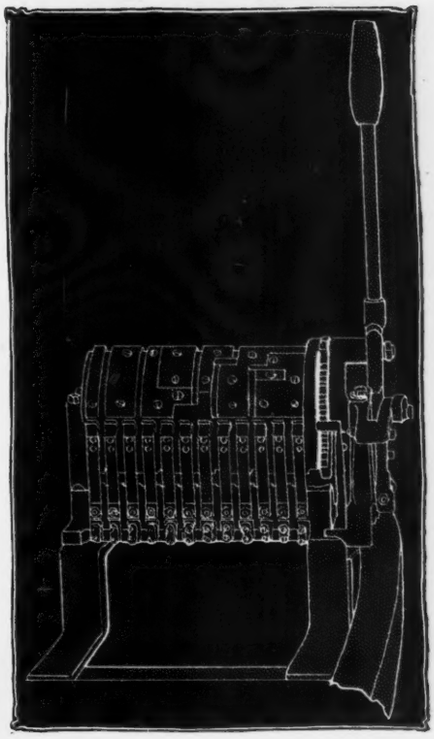


FIG. 93—ONE FORM OF CONTROLLER

This device is inserted between the batteries and the motor and is a means of regulating the voltage at which the motor is to operate. The controller is composed of a mass of switches

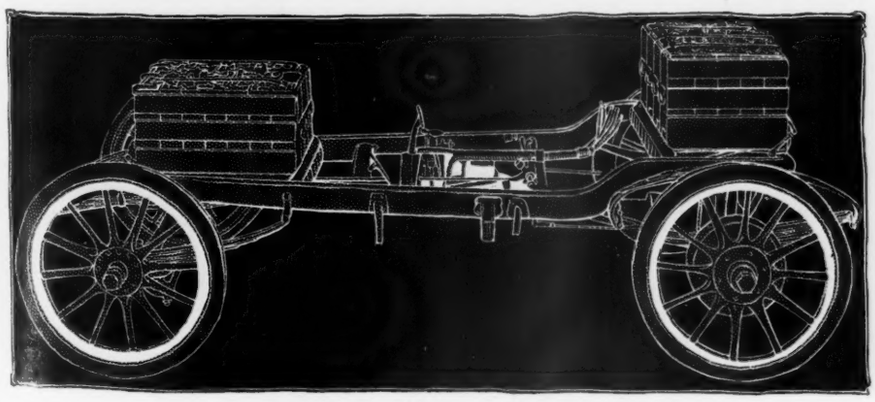


FIG. 91—CARRYING OF VEHICLE BATTERIES

Here is shown one method of carrying the batteries. In some cases only the front part of the chassis is used and in others only the rear. The above shows the method used on Woods cars In commercial vehicles the batteries are carried under the frame

The Motor Car Repair Shop

Watching for Dead Cells

A FEW weeks ago a car was brought into a local electric garage with apparently nothing wrong, but the car refused to go when the controller was pulled. The puzzling part to the owner was that he could operate the electric horn, but the car would not respond to the controller. This owner neglected to look at the voltmeter, for if he did he would have noticed that it read 80 volts when standing and as soon as the controller was pulled the dial dropped to zero. The repairman knew immediately where to look for the trouble and soon solved the problem.

He examined all the batteries and found two of them without solution. This caused an open circuit and hence the car was inoperative. This only brings out the necessity for keeping the plates covered with distilled water at all times.

In a case of this character it is best to take out the dead cells or disconnect them from the circuit temporarily, so that the car may be used.

Another common cause of the car stopping dead and refusing to respond to the controller is a burned lug. The lugs are made of metal with a lead base and should one be loose it will cause arcing when the car is operating. This arcing soon melts the lug, with the result that there is an open circuit in a short time. An ordinary wire connection will do temporarily, but a new lug should be substituted at the first opportunity

Making Electrolyte

In many garages occasion arises for the men to prepare electrolyte for lead cells. In doing this the acid should be poured into the water and not the water into the acid, should the vessel be an open one. The reason is that when the water is poured into the acid the latter usually splashes out of the container and a drop in one's eye may mean the loss of his sight. However, when the acid is spilled into the water the latter splashes and no danger is incurred. This method is used in all chemical laboratories whenever acids are diluted with water.

Home-Charging Methods

Home Methods of Charging

In Figs. 1 and 2 are shown methods of charging batteries at home. That shown in Fig. 1 consists in charging through a lamp bank. Eight lamp sockets are fastened to a board and then connected in parallel. Carbon lamps of 110 volts and ranging in wattage from 25 to 100 are placed in the sockets. The direct current line is connected to the bank. The leads from the bank go to the battery. In series with the line to the battery is placed an ammeter, and across the line, as shown, a voltmeter is placed. A suitable switch is placed anywhere in the circuit. The number of lamps to be operated depends upon the charging rate of the battery. Let us suppose that the initial charging rate is 6 amperes. Either six 100-watt lamps will approximate this figure or about five 100-watt lamps and three 50-watt lamps. The ammeter will read the number of amperes being drawn by the lamp bank and if the charging rate is initially 6 amperes and the meter reads 7, then too many lamps are in the circuit and one at a time should be unscrewed until the meter reads 6 amperes. In using lamps one must be sure they are for 110 volts, or perhaps 120 volts current. In Fig. 2 is shown another method of charging at home, by the use of a water rheostat. This rheostat consists of a small barrel containing two plates made of lead and acidified or salt water. Each plate should be about 1 foot square and ¼ inch thick. Such an arrangement may be used in a 110-volt circuit and the charging rate varied by the man in charge by bringing the plates closer together or separating them.

In the latter case, the resistance is made greater and in the former less.

Another way would be to place one plate at the bottom of the barrel and suspend the other place, so that by dropping or lifting the suspended plate the resistance may be made greater or less. The plates may be so distanced that the ammeter reads the correct charging rate of the battery. All makers issue instructions as to the initial and final charging rate for their different types of batteries. In attaching the battery to the circuit care should be taken to see that the positive of the line is connected to the positive of the battery, as shown.

Hints on Battery Care

Those who charge by the gravity method should consider that the specific gravity of the electrolyte varies as the temperature and that if the gravity at 60 degrees Fahrenheit is to be 1.28, if the temperature is 70 degrees a correction must be made. For every degree rise in temperature deduct .001 from the gravity of the liquid.

If any work, such as plate scraping and removing sediment is done a wooden stick should be used and not a knife or any other piece of metal.

It is a wise step to examine the battery connections once each month to see that they are not corroded. This condition adds resistance to the flow of current and battery efficiency is not up to standard. Scraping is a good method of removing this deposit.

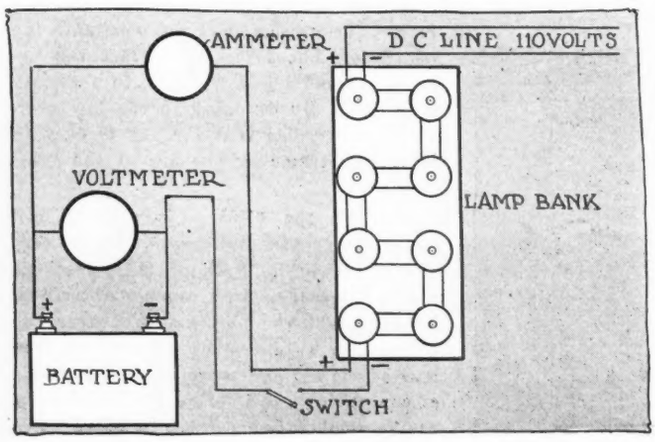


FIG. 1—ONE METHOD CHARGING BATTERIES

A lamp bank is used which consists of a number of carbon-filament lamps connected in multiple. The charging rate of the battery is known so all that remains is to get the ammeter reading the proper rate. This is done by either inserting or taking out lamps

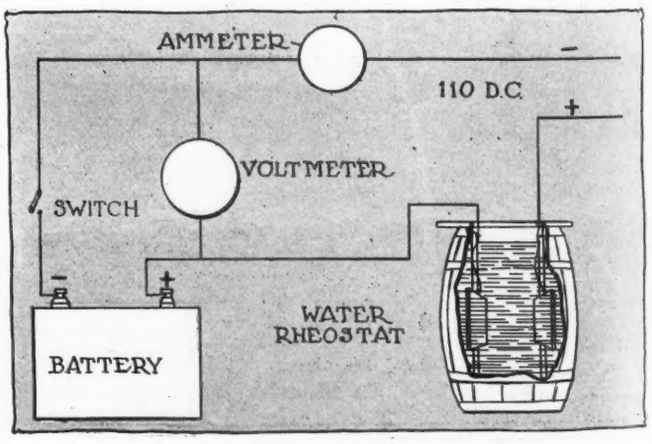


FIG. 2—WATER RHEOSTAT INSTEAD OF LAMPS

Here is shown another home method of charging which makes use of a water rheostat. The latter is a small barrel containing two lead plates to which the outside circuit is attached. By moving the plates the resistance is varied, until the meter reads properly

The Accessory Corner

G. B. Valve Tool.

INSTEAD of grinding valves in order to make them fit their seats perfectly, the Henes Sales Corp., Chicago, is marketing tools for dressing the valves and seats, under the name of G. B. valve tools. These tools are designed to cut the surface of the valve face and the seat in such a way as to make the parts fit perfectly.

In Fig. 2 is shown the operation of dressing the seat of a valve. As may be seen the tool is placed in a vise in an upright position. The valve stem is held firmly at the left end and clamped at the right end by means of the thumb nut. By turning the valve around a knife, made of tool steel, is made to cut from the face of the valve enough material to give the valve a new face. The angle at which the knife cuts is said to be exactly 45 degrees. The screw on top of the device is the knife adjustment. At the left of the illustration is shown the countersink for dressing the valve seat. This instrument also is said to cut at an angle of 45 degrees. With both valve face and seat new and cut at the same angle, perfect fitting is assured. The tools complete are listed at $25.

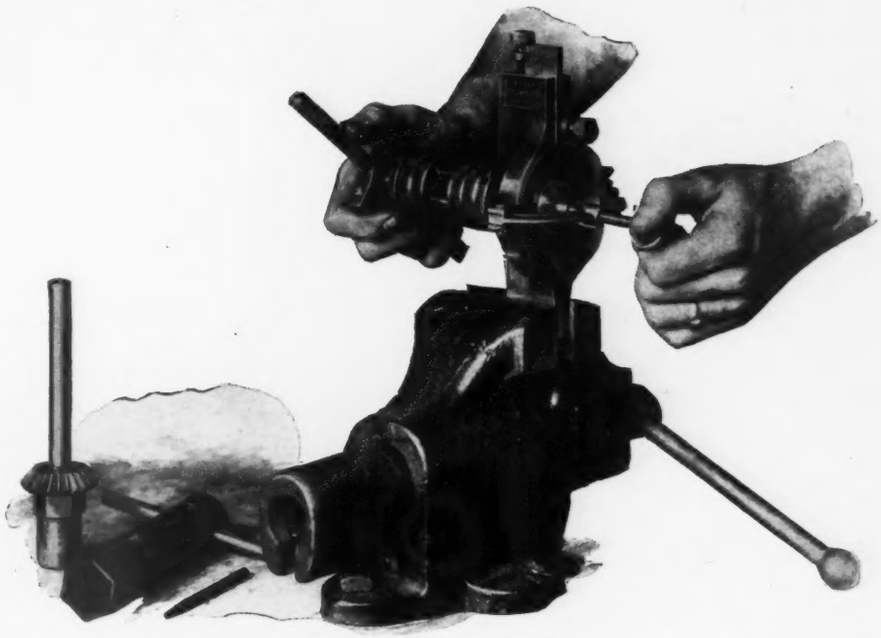


FIG. 2—G. B. VALVE TOOL
This device dresses the valve face and valve seat and cuts at an angle of 45 degrees

Lipman Air Pump.

The Lipman Mfg. Co., Beloit, Wis., is offering all metal air pumps for use in starting systems and for tire inflation which have some unique features. Two and four-cylinder models are offered, one of the latter being shown in Fig. 1 and the crankshaft and piston in Fig. 3. The pump shown, is constructed somewhat like the ordinary gasoline engine, having pistons, crankshaft, splash oiling, etc.

The cylinders and upper half of the crankcase are integrally cast and the material used is close-grained iron. The lower half of the crankcase which acts as an oil reservoir is made of aluminum. The connecting rods are made of bronze and the pistons and rings of iron. The pistons shown have but one ring, and are designed for use in a tire-inflating pump.

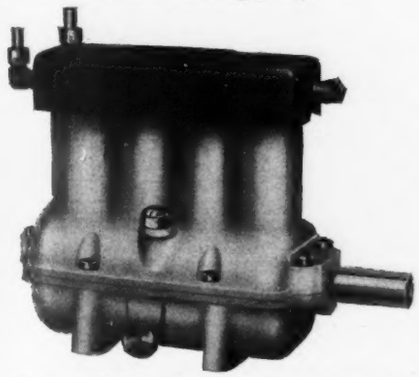


FIG. 1—FOUR-CYLINDER LIPMAN PUMP
This air pump is designed for use in cranking systems or in tire inflating. In the former case the pistons have two rings

The four-cylinder model shown in the illustration weighs 10 pounds and has a bore of 1¼ and a stroke of 1¼ inches. The width over all is 3½ inches, the height, 6⅜ inches and the length 7⅜ inches.

The Lipman company is offering brackets

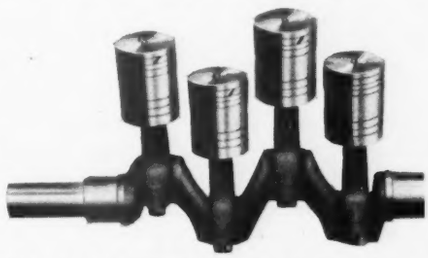


FIG. 3—CRANKSHAFT OF LIPMAN PUMP
The pistons are fitted with either one or two rings, according to the application of the pump

and fittings for attaching the pumps to all makes of standard cars, the price of these fittings including hose and gauge ranging from $10 to $15. The price of the four-cylinder pump non-water jacketed and using 1 ring in each piston is $25.

Vulite Carbon Remover.

Another concern has invaded the field of oxygen carbon removers, the Vulite Chemical Co., Boston, Mass., being the latest addtion. As in all such apparatus the oxygen is contained in a tank to which is attached a guage and a hose line, as shown in Fig. 4.

The method of removing carbon with the Vulite method consists in starting the engine and then shutting off the gasoline at the tank and permitting the engine to consume the fuel in the gas line. The spark plugs are then removed, or if necessary the cylinder plugs. The piston of the cylinder to be cleaned is then placed on top dead center and both intake and exhaust valves in the closed position. That is the cylinder would be about to fire. The nozzle is introduced into the cylinder through the plug opening. A valve on the oxygen tank is opened until the gauge reads 10 pounds pressure and then a lighted match is thrown into the cylinder. A wax-taper may be used, also, or any convenient method of applying flame to the cylinder. The carbon will burn in the presence of oxygen and in a few minutes the entire deposit is said to be consumed.

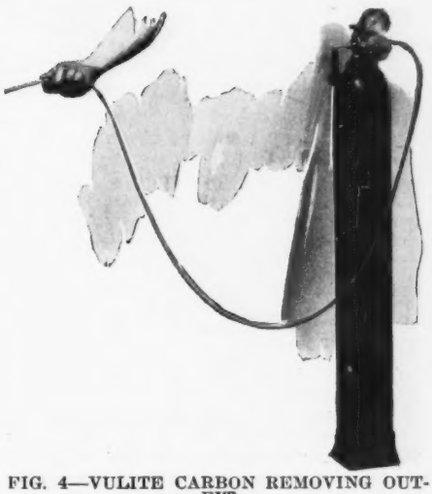


FIG. 4—VULITE CARBON REMOVING OUTFIT
Oxygen is introduced into the cylinders at 10 pounds pressure and the carbon is burned in the presence of the gas

From the Four Winds

MONTREAL to Have Motor Show—The annual Montreal motor show will be held in the Drill hall this year during 2 weeks beginning January 24. The promoter is the Automobile Trade Association, which was incorporated and chartered recently.

Napier Storms the Alps—Under the official observation of the English Royal Automobile Club, a six-cylinder Napier recently was put through a most exacting climbing test. In the trials, the car scaled every pass of note in the Alps and Dolomites, covering 2,100 miles on the mountains.

Carriage Builders Boost Motor Car—That motor cars aid their business rather than hurt it was the assertion of carriage men attending the forty-fifth annual convention of the Carriage Builders' National Association, which adjourned at St. Louis last Thursday. The organization is the oldest in the United States and is exclusively for makers of horse-drawn vehicles.

Kansas City Show February 16-21—The motor show at Kansas City, Mo., will be held this winter from February 16 to 21, according to the recent announcement of the committee. The truck and pleasure car shows will be merged this year, following the precedent of national shows. The show will be in charge of E. E. Peake, secretary of the motor car dealers' association.

Drastic Remedy for Speeding—At the annual meeting of the Ohio Police Chiefs' Association, held in Cincinnati recently, Chief Carter of Columbus suggested that the best way of stopping speeding was to take away the motor car or motorcycle of the offender for a period of at least 30 days and not to exceed 60 days. The idea was endorsed by a number of chiefs from other cities.

Ohio Motorists Early Birds—Many applications for 1914 number plates are being received by the Ohio state motor department, although it is more than 2 months before they can be of use. There have been a number of applications for tag No. 1, several for tag No. 100 and a score or more for tag No. 1000. The 1914 tags will have bright red letters on a white background.

Intercity Race at Birmingham—New Orleans, Atlanta, Nashville and Memphis will enter cars in the 100-mile intercity race which is to be run at Birmingham, Ala., October 29. The regulation short distance races also will be run. The meet is in charge of William Donovan, the promoter of the Fourth of July races at Memphis and the recent successful meet at Nashville.

Missouri Has Charge of Chauffeur's School—The state of Missouri has started a school for chauffeurs. The trustees of the Lincoln Institute, a state school for negroes at Jefferson City, last week purchased a motor car in St. Louis. The machine will be taken to the school, where the students will be trained in driving and repair work. Experienced drivers say that anyone who can run a car on the hilly roads of Cole county should be entitled to a certificate vouching for his efficiency.

Cleveland Show January 10-17—The question of holding the annual motor show late or early has been decided in favor of the early show by the Cleveland Automobile Show Co., and by arrangement with the Automobile Chamber of Commerce, the Cleveland show this year will be held immediately following the New York exhibition. It will open January 10 and run through January 17. The Cleveland company, which is a dealers' organization, has engaged the biggest building available, the new Euclid Square building, which affords an acre and a half of display space, all on one floor. The Cleveland Automobile Club also gives this show its sanction.

Demand for Cars in Hayti—Street improvements in Port au Prince, Hayti, and better roads in the interior of the island have resulted in the opening of a demand for motor cars. There are now between sixty and seventy cars in use on the island. This number will be doubled within the next year, dealers there report.

No Getta da Ride; Giva da Shoot—Because an Italian in Greenwich, Conn., was not permitted to ride in a motor car with a number of workmen, he became incensed and fired a revolver as the machine sped away. One of the bullets took effect in the neck of an occupant of the car. When arrested the Italian stated that he was jealous and wanted revenge.

Want White Danger Flags Abolished—There is considerable agitation at this time regarding the use of white signals at railroad crossings throughout the state of Connecticut. On the New York, New Haven & Hartford system, which covers the whole state, the white flag is used instead of a red one, with much confusion and several accidents because motorists do not pay heed to the white flag. The Connecticut Automobile Association is agitating a change in the prevailing color scheme at railroad crossings.

Uses Four Cars in Political Campaign—An unheard of political campaign is that of the Progressive party candidate for governor of Massachusetts, Charles Sumner Bird, who is visiting every city and town in the state. Over more than 3,000 miles of highway, some stretches all but impassable, up and down mountain sides, through mud up to the hubs, through sand that clings like clay, he and his party are going into the smallest hamlets as well as the largest cities in four Stevens-Duryea cars. This tour will cover 26 days, during which the speakers will have meetings at the postoffice in every city and town in the state, except where rallies are otherwise advertised.

Use Six Tires on Long Trip—Crossing the American continent in a motor car is no longer considered unusual, but there are conditions when such an achievement attracts attention. C. Haven Smith of San Francisco has just ended a trip from the Golden Gate city to New York, made under novel conditions. Smith, an amateur driver, piloted a Locomobile from coast to coast in 30 days, and thereby won a large wager. He was limited to six tires in order to qualify for the money. Another of the unique conditions was the stipulation whereby he was not permitted to enter a garage or repair shop along the route for the purpose of making repairs or adjustments.

Special Building for Motor Exhibit—For the first time in the history of the state fair at Dallas, Tex., the motor exhibit is apart from the machinery and other vehicle displays. This year a special building, 146 by 290 feet, has been constructed for motor car displays. Dealers in Dallas consider that the display at the fair this year will do much to increase sales. Last year sales of cars made through Dallas agencies totaled $12,000,000. By showing the new models with the many improvements that have been made over last year's cars it is believed that even a greater distribution of cars will be made during the present season. In order to get the new building it was necessary for the dealers to split the expense with the fair association. Forty-one makes of cars are on exhibition.

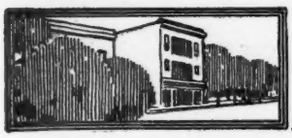
Reliability Run for Toledo Motorists—A reliability run is being planned by the Toledo Automobile Club to take place early in November. The contest will be run under the sanction of the American Automobile Association and its rules will govern the scores and penalties. Trophies will be awarded those making perfect scores. The route selected for the run which will be a 2-day event is to Dayton via Marion and Columbus and return by way of Piqua and Lima. This will give a 209-mile run.

To Cut Tour Trophy in Half—The three-cornered tie for first place in the reliability run of the St. Louis Automobile Club, held October 4, was settled last week by the flip of a coin. A. H. Zucker and Clarence King, Cadillacs, won first place and will cut the trophy in two, each getting half, with Zucker having choice of the halves. Louis Manne, the third driver in the tie, took second prize, a gold club emblem watch fob. Each had a score of 998 out of a possible 1,000 in the touring class. Edward A. Limberg took first money in the roadster class, finishing the 122-mile run in a Locomobile with 994 points.

Y. M. C. A. Buys Motor School—The New York School of Automobile Engineers, 146 West Fifty-sixth street, has changed ownership, having been absorbed by the Automobile School of the West Side Young Men's Christian Association, Eighth avenue and Fifty-seventh street. The entire equipment has been moved to the Y. M. C. A. school and the students who had started courses under the old management are now finishing their studies in the Y. M. C. A. school. As a result of the absorption an arrangement has been made with the International Motor Car Co. whereby the Y. M. C. A. school will train men for the International.

Good Roads Boom in Washington—The $264,418 appropriation made by the last Washington legislature for the Pacific highway will be more than doubled by the expenditures of the counties along the right of way during the biennium. The first authoritative figures compiled in regard to road construction and surfacing under Washington's permanent highway law, enacted 2 years ago, show that already 255 miles of graded and hard-surfaced highways have been provided in the state at a cost of $2,102,451, this including 163.8 miles actually constructed at a cost of $1,199,452, and contracts already let, on which work is now under way, calling for the construction of 91.5 miles at a cost of $902,999.

Arizona Bonds Insure Better Roads—By an overwhelming majority the voters of Yuma county, Ariz., recently carried a bond issue of $500,000 for road improvements. The bonds run 25 years and bear interest at 5 per cent. An offer has already been received for the entire issue. Yuma county has set an example which many other Arizona counties are expected to follow. Mohave issued bonds in the sum of $50,000 nearly a year ago but set the interest rate too low and no sale has been made. Another election probably will be held and a larger issue endorsed. In Maricopa county, which includes Phoenix and the great Salt River valley, an issue of $1,000,000 is being agitated with great success.



Among the Makers and Dealers

MORE Room for White Painters—The White Co., of Cleveland, is building an addition to its motor car paint plant. The main shop will be enlarged by the addition of a building 240 by 30 feet.

Pollock Joins Locomobile Forces—M. A. Pollock, until recently advertising manager for the Taylor Instrument Co. of Rochester, N. Y., has been appointed assistant advertising manager of the Locomobile Co. of America.

Ten Broeck Tire Plant Busy—The Ten Broeck Tire Co., Louisville, Ky., which was organized about the first of the year with a capital of $250,000 paid in, is now operating a plant at Twenty-sixth and Courtney streets, and makes three types of pneumatics for motor cars and a motorcycle tire. The plant has been running all season at capacity.

Robinson Is Packard Comptroller—F. R. Robinson, chief accountant of the Packard Motor Car Co., has been appointed to the position of comptroller of the company. In addition to his new duties as comptroller, he will be the direct representative and assistant to General Manager Alvan Macauley. Mr. Robinson has been connected with the Packard Motor Car Co. for the past 4 years.

More Drawback for Keeton—Under an order issued by the secretary of the treasury, the department's regulations of August 19, 1913, providing for the payment of drawback on motor cars manufactured by the Keeton Motor Co., of Detroit, with the use of imported ball bearings, have been extended to cover transmissions and rear axles for such motor cars manufactured by said company with the use of imported ball bearings.

Tire Salesmen Fish for Tarpon—The Fisk Co. of Texas, state agent for Fisk tires, has just carried out a very novel and interesting scheme to stimulate interest in its sales organization. Early in the spring, the salesmen of the Dallas and San Antonio branches started a sales contest. San Antonio won by a neck and the victors were entertained for a week at Tarpon island, where they fished for the fighters of the sea. Each of the losers was assessed $10 to pay for the entertainment of the winners.

American Holds Annual Meeting—The annual meeting of the stockholders of the American Motors Co. was held at the general offices in Indianapolis recently. The following directors were elected for the ensuing years: J. I. Handley, V. A. Longaker, D. S. Menasco, Frank E. Smith and J. E. Kepperley. Immediately following the stockholders' meeting and election of directors, the directors met and elected officers as follows: J. I. Handley, president and general manager; F. E. Smith, vice-president; V. A. Longaker, chairman and treasurer; J. D. Bright, assistant treasurer, and J. E. Kepperley, secretary.

Marathon May Move to Louisville—According to a report current in Louisville, Ky., the Marathon Motor Works, of Nashville, Tenn., may move to Louisville. From Nashville comes the news that Louisville has offered the Marathon people a free factory site and $50,000 as the chief inducement for locating in the Kentucky metropolis. Recent visits of Louisville capitalists to Nashville indicate that Louisville men are anxious to take over the property. Although these reports are unconfirmed, the secretary of the Louisville Commercial Club admits that this organization has been in communication with the Nashville plant for some time in an effort to bring about the removal of the factory.

Barker Leaves Chase Company—Robert M. Barker, who for the last 2 years has served as advertising manager of the Chase Motor Truck Co. of Syracuse, N. Y., has resigned from that company and accepted a similar position with the Palmer-Moore Co. of Syracuse.

Mosler Output Remains Same—Although the report is out that the Bronx parkway commission contemplates acquiring the land and factory of A. R. Mosler & Co. of New York, maker of spark plugs and motor car specialties, the officials announce that the rumored condemnation proceedings will not interfere with the output or deliveries.

Crown Building Light Car—The Crown Motor Car Co., Louisville, Ky., is perfecting a light car to sell at about $400. Contrary to the general belief this car will not be in the cyclecar class, in so far as dimensions are concerned, as it will have standard tread and a four-cylinder block motor, and in every way approximate the accepted type of motor car, except as to size and weight. Whether the Crown company will remain in Louisville permanently has not yet been decided, it being quite possible that the plant will be located in some one of the manufacturing cities of Indiana, although no decision has yet been made.

Klaxon Starts Prize Contest—In order to learn what Massachusetts residents think of the matter, the Lovell-McConnell Mfg. Co. of Newark, N. J., maker of the Klaxon, has offered $250 in prizes for the seven best suggestions as to the proper use and regulation of warning signals on motor cars. The following have been named to make the awards: William L. Douglas, former governor of Massachusetts; James A. Gallivan, chairman of the board of street commissioners, Boston; George S. Ladd, member of the United States bureau of highways; and Daniel F. Gay, director of the American Automobile Association.

Spare Universals for Michigan Cars—The Blood Bros. Machine Co. of Kalamazoo, Mich., maker of motor car parts, announces that it has in stock universal equipment for Michigan cars, the manufacture of which has been discontinued.

Airless Tire Company Formed—The Akron Airless Tire Co. of Akron, O., has been formed by a number of capitalists to make and sell a rubber core to be used in the place of inner tubes in pneumatic tires for motor cars, motor trucks and motorcycles. Offices have been opened in the Second National Bank building.

Novel Advertising for Oakland—Oakland agents all over the country are pushing a novel advertising scheme. The Lincoln highway emblem, consisting of the red, white and blue horizontal-barred poster with a big L in the middle, has been altered by using the L for the middle letter in the word Oakland. These posters are to be put up all over the country, the Lincoln highway route being especially lined with them.

New M. and A. M. Members Elected—The following firms have been elected to membership in the Motor and Accessory Manufacturers: The Cleveland Tanning Co. of Cleveland, O.; Racine Mfg. Co. of Racine, Wis.; Benford Mfg. Co. of Mt. Vernon, N. Y.; Gemmer-Detroit Starter Co. of Detroit, Mich.; McGraw Rubber and Tire Co., of East Palestine, O.; J. M. Shock Absorber Co. of Philadelphia; F. S. Carr Co. of Boston; Torbensen Gear and Axle Co. of Newark, N. J.; Taylor Instrument Co. of Rochester, N. Y.; Reynolds-Brown Co. of Chicago, and Knight Tire and Rubber Co. of Canton, O. These additions make the total membership of the organization 258 to date.

Recent Incorporations

Boston, Mass.—Rock Oil Motor Co., capital stoock, $50,000; incorporators, W. W. Potter, C. M. Ludden, A. M. McLean.

Buffalo, N. Y.—Oakland Distributing Co., capital stock, $20,000; motor car business; incorporators, F. Eaton, T. F. Donohue, W. C. Grey.

Buffalo, N. Y.—Star Motor Delivery Ca., capital stock, $20,000; incorporators, J. B. Corcoran, W. H. Corcoran, R. H. Connor.

Bridgeport, Conn.—Aurora Vulcan Co., capital stock, $250,000; to manufacture spark plugs; incorporators, S. S. Day, H. Y. Billings, R. K. Hall.

Charles City, Ia.—Western Motor Appliance Co., capital stock, $25,000; incorporators, G. F. Heitz, W. Btuz, W. J. Frevert.

Chicago—Ross Sleeve Motor Co., capital stock, $20,000; to manufacture motors; incorporators, F. W. Bull, E. Lundblad, A. S. Lytton.

Cleveland, O.—Universal Carburetor Co., capital stock, $10,000; incorporators, G. A. Hynon, F. H. Pelton, and others.

Dayton, O.—Parker Auto Repair Co., capital stock, $5,000; general repair business and garage; incorporators, L. V. Browne, G. P. Hall, H. R. Marquis, C. G. Hussey, M. R. Browne.

Detroit, Mich.—Detroit Cyclecar Co., capital stock, $100,000; to manufacture motor cars; incorporators, A. R. Thomas, P. H. Cale.

Detroit, Mich.—Hawk Motor Car Co., capital stock, $50,000; incorporators, F. S. Salter, W. W. McIntyre, D. Tinnitts.

Dover, Del.—Spring Cushion Tire Corp., capital stock, $300,000; incorporators, W. I. N. Lofland, J. S. Collins, Jr., W. F. P. Lofland.

Fort Worth, Tex.—A. P. Mitchell Auto Co., capital stock, $15,000; incorporators, A. P. Mitchell, E. M. North, E. L. Malone.

Kansas City, Mo.—Thorp-Allen Motor Co., capital stock, $10,000; to manufacture motor cars; incorporators, W. R. Thorp, H. B. Thorp, H. L. Allen.

Montreal—Kelly Springfield Tire Co., capital stock, $500,000.

Mount Vernon, N. Y.—Chester Hill Motor Car Co., capital stock, $1,000; incorporators, A. Levine, M. J. Levine, S. Levine.

Muncie, Ind.—B. T. K. Gear & Engine Co.; incorporators, F. M. Boyer, A. Boyer, J. P. Kandel.

New York—Yorkville Auto Supply Co., capital stock, $10,000; to manufacture tires; incorporators, S. Richman, W. Yates, A. E. Stacy.

New York—Markell Corp., capital stock, $1,000; incorporators, A. B. Graham, A. E. Stevenson, M. J. Pelikan.

New York—C. & P. Kerosene Carburetor Co., capital stock, $100,000.

New York—Suffolk Lubricating Oils and Gasoline Co., capital stock, $1,000; incorporators, S. Mamorick, L. Mamorick, A. Abramson.

New York—Welding Supply Co., capital stock, $5,000; to manufacture and deal in motors; incorporators, W. E. McDonnell, M J. McDonnell, A. M. Matheson.

New York—John M. Brissen Co., capital stock, $25,000; motor car business; incorporators, T. F. MacMahon, J. M. Brissen, W. H. Glover.

New York—Allied Motor Accessories Co., capital stock, $140,000.

New York—Phelps Motor Car Corp., capital stock, $50,000; to manufacture motors; incorporators, F. L. Sanford, E. P. Craw, H. A. Biggs.

Oneida, N. Y.—Oneida Motor Car Co., capital stock, $10,000; incorporators, F. E. Petrie, E. P. Aubeuf, F. F. Aubeuf.

St. Louis, Mo.—S. & H. Puncture Cure Co., capital stock, $25,000; incorporators, G. A. Shine, F. G. Smith, H. H. Heckert.

Washington, D. C.—Miller's Inner Tire Core Co., capital stock, $260,000; to manufacture and deal in tire filler.

Brief Business Announcements

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make
Alpine, Tex.	Young & Richards	Chandler
Akron, O.	C. H. Shubert & Son	Cole
Ashland, Ore.	H. G. Butterfield	Cole
Astoria, Ore.	Nelson Zapf Auto Co.	Cole
Baltimore, Md.	Milton Avenue Garage	Metz
Baltimore, Md.	American Motors Co.	Marion
Bayshore, N. Y.	Jacob Finkelstein	Oakland
Boston, Mass.	Wentworth-Fosdick Co.	Lozier
Boston, Mass.	Vanernin & Paddon Co.	Apperson
Boston, Mass.	Marathon Motor Car Co.	Marathon
Boston, Mass.	E. P. Blake	Imp
Campton, N. H.	Miss Carrie E. Royce	Oakland
Chicago, Ill.	Cantaur Motor Co. of Illinois	Jeffery
Chillicothe, Mo.	Adams & Son Gro. Co.	Cole
Cleveland, O.	R. M. Allen Motor Sales Co.	Kind
Cleveland, O.	M. D. Coate	Detroiter
Columbus, O.	Broad-Oak Auto Co.	Reo
DeKalb, Ill.	G. H. Dean & Co.	Cole
Eagle Pass, Tex.	Jos. De Bona	Chandler
El Paso, Tex.	Tri-State Motor Car Co.	Chandler
El Paso, Tex.	Geo. L. Fisher	Overland
Emporia, Kan.	Warren Ellis	Cole
Fort Worth, Tex.	Chandler Motor Car Co.	Chandler
Galveston, Tex.	New Island City Garage	Kisselkar
Garner, Ia.	Garner Automobile Co.	Cole
Gastonia, N. C.	Gastonia Garage Co.	Cole
Georgetown, Del.	Georgetown Garage & Supply Co.	Oakland
Greenville, Tex.	W. S. Mattox	Kisselkar
Grosbeck, Tex.	Oliver-Nussbaum-Scarf Co.	Kisselkar
Hartford, Conn.	M. J. Bliss	Cole
Hale, Mo.	Avery Grain & Implement Co.	Palmer & Singer
Hemstead, N. Y.	W. T. Hutcheson	Cole
Houston, Tex.	James C. Clinton	Chandler
Houston, Tex.	Northrup & Clark Saddlery Co.	R. C. H.
Houston, Texas	Oakland Motor Co.	Oakland
Huntington, L. I.	Walter Flessel	Cole
Indianapolis, Ind.	Wild Auto Co.	Chicago electric
Indian Head, Sask.	Bingham Implement Co.	Cole
Joplin, Mo.	Greenlease Co.	Cadillac
Kansas City, Mo.	White Motors Co.	Chandler
Kansas City, Mo.	Motor Sales & Service Co.	Chase
Kansas City, Mo.	Thorpe-Allen Motor Co.	Studebaker
Kansas City, Mo.	Southwest Motor Co.	Chevrolet
Kansas City, Mo.	Bond Motor Co.	Oldsmobile
Kingston, Ont.	F. A. Bibly	Cole
Kingsville, Tex.	Plato & Allen	Kisselkar
Leominster, Mass.	Leominster Garage & Auto Co.	Oakland
Lewiston, Me.	R. A. Partrich	Palmer & Singer
Lowell, Mass.	Howard St. Garage	McFarlan Six
Manchester, N. H.	Brodie Electric & Auto Co.	Reo
Mankato, Minn.	Harry H. Perrin	Cole
Marietta, O.	J. Katzenstein	Cole
Marshfield, Ore.	Nelson Iron Works	Cole
McMinnville, Ore.	A. S. Dixon	Cole
Medicine Hat, Alb.	Jas. T. Berry	Cole
Memphis, Tenn.	Premier Sales Co.	Oakland
Mexia, Tex.	Joseph Nussbaum & Co.	Krit
Milwaukee, Wis.	Reeke-Osmond Motor Car Co.	Jeffery
Milwaukee, Wis.	Jesse A. Smith Auto Co.	Marathon
Minneapolis, Minn.	L. W. Pitcher	Columbus Electric
Minneapolis, Minn.	L. W. Pitcher	Firestone-Columbus
Minneapolis, Minn.	L. A. McKay	Franklin
Montreal, Que.	Rosseau Bros., Ltd.	Cole
More, Ore.	W. H. Moore	Cole
Moro, Ore.	W. H. Moore	Cole
Morgan, Tex.	S. J. Covey	Krit
Napoleon, O.	Rohrs & King	Cole
New Haven, Conn.	Bradford Auto Sales Co.	Cole
Oblong, Ill.	Oblong Auto Co.	Cole
Ogdensburg, N. Y.	F. B. Parker	Cole
Oregon City, Ore.	Sullivan Bros.	Cole
Overton, Tex.	J. O. Tucker	Krit
Orwigsburg, Pa.	Ralph H. Diebert	Oakland
Oxnard, Cal.	Crescent Garage & Mach. Co.	Cole
Oyster Bay, L. I.	Elbert Tappan	Cole
Palouse, Wash.	Palouse Hardware Co.	Reo
Peoria, Ill.	Cole Motor Co.	Cole
Philadelphia, Pa.	Minerva Motor Co.	Moon
Pine Bluff, Ark.	Mann Motor Car Co.	Apperson
Portabe La Prairie, Man.	A. R. Hoover	Cole
Portsmouth, O.	W. J. Friel	Chalmers
Port Arthur, Ont.	Tourist Taxi Garage	Cole
Pittsfield, Mass.	Van Sleet-Schwartz Co.	Reo
Prince Albert, Sask.	Owners Garage Co.	Cole
Putnam, Tex.	C. T. Hutchinson	Krit
Rockville Centre, L. I.	Gardner Garage & Motor Car Co.	Cole
Russellville, Ark.	Radsdale Auto Co.	Ford
Salem, N. J.	Geo. B. Smith	Oakland
San Antonio, Tex.	Lozier Co. of San Antonio	Chandler
San Antonio, Tex.	Velie Auto Sales Co.	R. C. H.
San Francisco, Cal.	Jeffery Auto Sales Co.	Jeffery
Santa Barbara, Cal.	H. Wood & Son	Cole
Sayville, L. I.	Stenger & Rohm	Oakland
Seattle, Wash.	E. T. Clark	Chandler
Schenectady, N. Y.	H. W. Chubb	Cole
Shelby, Mont.	James A. Johnson	Cole
Silver Creek, N. Y.	F. B. Porter	Cole
Springfield, Mo.	Herbert E. Seeley	Franklin
Springfield, Ill.	R. T. McClain & Son	Palmer & Singer
Stamford, Conn.	Mechaley Auto Co.	Oakland
St. Joseph, Mo.	H. R. Lewis	Cole
St. Louis, Mo.	M. W. Bond Auto Co.	Chase
St. Louis, Mo.	Johnson Automobile Co.	Fore
Swift Current, Sask.	J. G. Maxwell	Cole
Sycosset, L. I.	Frank B. Whitsen	Oakland
Tacoma, Wash.	Dr. C. A. Taylor	Chalmers
Terre Haute, Ind.	H. Anderson	Cole
Trenton, Mo.	Joseph Kelso	R. C. H.
Uniontown, Wash.	J. J. Wells	Reo
Westhampton, L. I.	D. H. Losee	Cole
Wichita, Kan.	Jones Auto Exchange	R. C. H.
Wichita, Kan.	J. J. Jones	Wahl
Woburn, Mass.	Geraghty Motor Co.	Buick
Wright City, Mo.	Nieburg Mfg. Co.	Reo
Wright City, Mo.	Nieburg Mfg. Co.	Chevrolet

WASHINGTON, D. C.—W. F. Meyer, who has been connected with the Motz Tire and Rubber Co. at Akron, O., has been appointed manager of the Washington branch.

Seattle, Wash.—Ira D. Lundy, one of the pioneers of the motor car business in Seattle, has retired from the trade. His large garage has been purchased by the Hamilton Automobile Co., which is in the market for an agency.

St. Louis—H. L. Austin, formerly connected with the tire business in this city, has returned to St. Louis after an absence of several years spent in New York and will take charge of the tire department of the Fred Campbell Motor Accessory Co.

St. Louis—During the present season, the Ford will be sold in St. Louis by but one dealer, the Johnson Automobile Co., and the factory branch, the Ford Motor Car Co. During the past season several local dealers have been agents for the car.

Columbus, O.—H. L. Haight, formerly with the advertising department of the Cussins department store, has purchased the garage and repair shop located at 765 East Long street, Columbus, O., from H. S. Rhoades. The name of the establishment will be the Long-Garfield Garage and Taxicab Co. A sub-agency to handle the Studebaker line under the Twyman Motor Car Co. has been arranged for.

Raton, N. M.—G. D. Siemantel has purchased the Sperry Garage at Raton, N. M., and renamed it the National Garage. Raton is the gate city to New Mexico on the National Old Trails road.

Bowling Green, O.—H. A. McCory and E. A. Aller have purchased the interest of Mont Clouse in the Clouse Vulcanizing Works on South Main street, Bowling Green, O. The Bowling Green Rubber Co. will use a portion of the building for the manufacture of tire reliners and accessories.

Columbus, O.—The Westcott Motor Sales Co. has been organized with E. W. Craighead as general manager and located at 248 North Fourth street, to handle the Westcott in central Ohio. Permanent headquarters will be located at 138-140 East Chestnut street later.

Milwaukee, Wis.—The Archambault Motor Car Co. of Milwaukee, for several years representative of the Lozier and Michigan, with garage and salesrooms at 177-179 Ogden avenue, has been dissolved. E. J. Archambault, the proprietor, is a prominent baseball magnate. The quarters are now occupied by the Hughes Motor Car Co., agent for the Apperson in Wisconsin. The Lozier is represented now by the McDonald Motor Car Co.

Boston, Mass.—Arthur G. Beharrell, who has been connected with the Boston branch of the Velie Motor Vehicle Co., has accepted a position with the Studebaker Corp. of Boston.

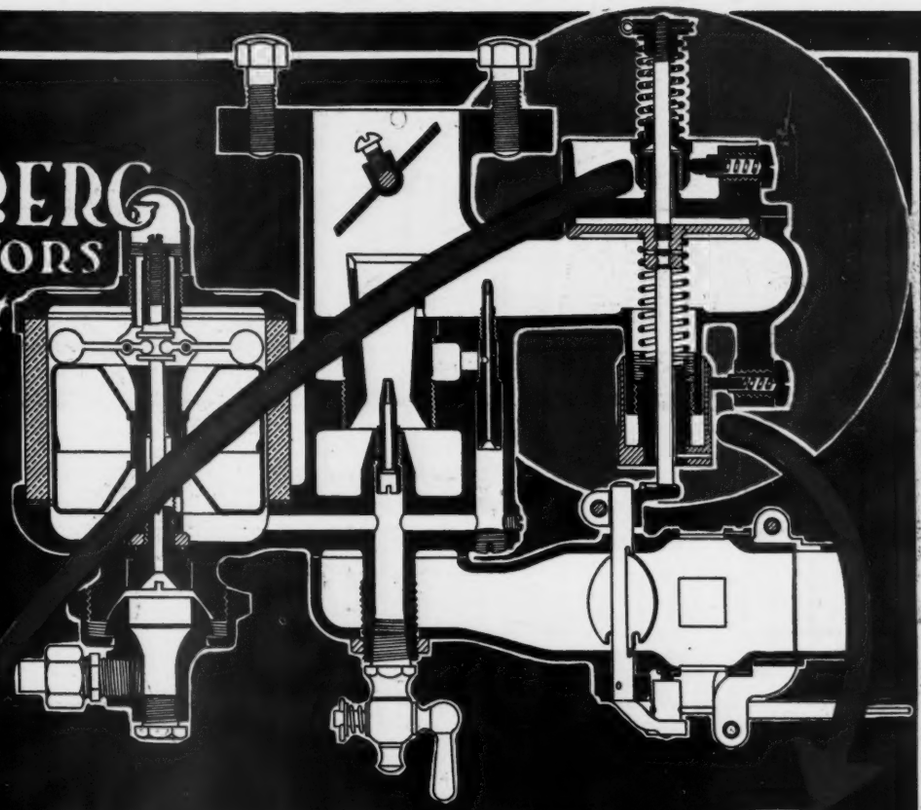
Baltimore, Md.—C. W. Wright has been appointed general manager of the Colonial Motor Co., Maryland representative for Studebaker pleasure cars and Universal trucks.

Chicago—The F. E. Lortz Co. of Cleveland, O., specializing in the manufacture of fore doors for old cars and a coupe body for the Ford, has opened a Chicago distributing branch at 1547 South Michigan avenue.

Chicago—M. J. Lanahan, formerly manager of the Ford retail department in Chicago, has joined the sales force of Thomas J. Hay, the local Stiaver and Hubmobile distributer, in the capacity of manager of retail sales.

Montreal, Can.—The Universal Electric Economy Co., Montreal representative of the Buffalo electric, was put in liquidation recently by order of Justice Panneton on the demand of Walter Rowlings, who has a claim against the company for more than $3,000. Paul Turgeon has been appointed provincial liquidator.

Why STROMBERG CARBURETORS are easiest to adjust



B

If you have too much gas on high speed, turn "B" up; if not enough turn "B" down.

A

If the low speed mixture is too "lean," turn nut "A" up; if too "rich," turn "A" down.

There are only two adjustments on the STROMBERG Carburetor—both on the air. The STROMBERG low speed adjustment is *distinctly separate* from the high speed adjustment.

This makes it possible for you to adjust a STROMBERG Carburetor to a *perfect low speed mixture,* without interfering in any way with the high speed mixture. At the same time it enables you to adjust a STROMBERG to a *perfect high speed mixture* absolutely without interfering with the carburetor's low speed adjustment.

STROMBERG CARBURETORS

"The Accepted Standard"

This principle of a *separate* high and low speed adjustment has remained unchanged on STROMBERG Carburetors since their appearance on the market 6 years ago.

Stromberg Motor Devices Company

54 E. 25th Street **CHICAGO, ILLINOIS**

BRANCHES:

New York, Boston, Detroit, Indianapolis, Minneapolis

PACIFIC COAST DISTRIBUTORS: Chansler and Lyon Co. Los Angeles, Portland, Fresno, Spokane, San Francisco, Seattle. Canadian Distributors: Russell Motor Car Co., Toronto, Montreal, Hamilton, Winnipeg, Calgary, Vancouver.

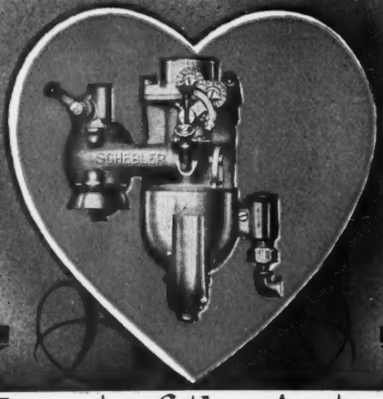
Anyone can adjust a Stromberg

Be your own Carburetor Expert

Contributor to the Lincoln Highway

SCHEBLER

The Aristocrat of Carburetors



"*The* Heart of the Automobile"

WHEELER & SCHEBLER

"Pioneers in Perfection" of Carburetion

MANUFACTURERS
INDIANAPOLIS U·S·A·

THE SCHEBLER IS THE ACKNOWLEDGED STANDARD CARBURETOR OF THE WORLD

Branches

EW YORK
OSTON
HILADELPHIA
TLANTA
INNEAPOLIS
ANSAS CITY
HICAGO
DETROIT
DENVER
SAN FRANCISCO
LOS ANGELES
SEATTLE
MONTREAL CAN.
SIDNEY AUSTRALIA

Service Department
Distributors

Every city and town in the United States and Canada · Europe and · · Australia · ·

These cars are Klaxonized

A. E. C.
Alco
Armleder
Autocar
H. H. Babcock
Benz
Borland Electric
Broc Electric
Buffalo Electric Roadster
Century Electric
Charon (European)
Chicago Electric
Columbia
Croxton
Davis
F. I. A. T.
Havers "Six"
King
Kissel
Knickerbocker
Knox
Lancia (European)
Locomobile
Lozier
Marmon
Matheson
Maxwell "Six"
Mercedes
Metallurgique
Mors (European)
Multiplex
National
Nyberg
Oakland
Ohio "Six"
Oldsmobile
Packard
Peerless
Peugeot
Pierce-Arrow
Pope-Hartford "Six"
Pratt
Rambler
S. & M. "Six"
Schneider (European)
S. G. V.
Simplex
Stafford
Staver
Stearns
Sternberg
Stevens-Duryea
Stoddard-Dayton
Touraine
Walker Electric
Ward
White
Winton

When you buy a car
ask about the Warning Signal

IF the salesman says "Klaxon" you will know something about the car.

You will know that the car maker has not spared expense to give you the BEST he can buy from radiator to tail-light.

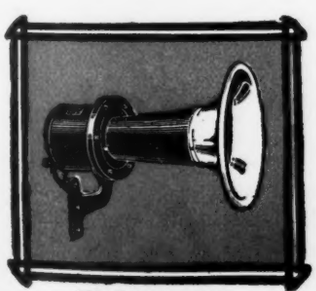
You will know that he is paying from two to eight times as much for the Klaxon as he would have to pay for a cheap unknown "electric horn."

If he equips with the highest priced warning signal, he will not skimp on motor, transmission, axles

IF the salesman says "electric horn" or "just like the Klaxon," ask him what kind of horn. In nine cases out of ten, HE WON'T KNOW.

You will know something about THAT car. The maker is supplying an inferior, unknown accessory, where, from a standpoint of safety alone, he should supply the best—just as he should supply the best brakes.

That car is built around a price. Safety and quality are secondary.



KLAXONET

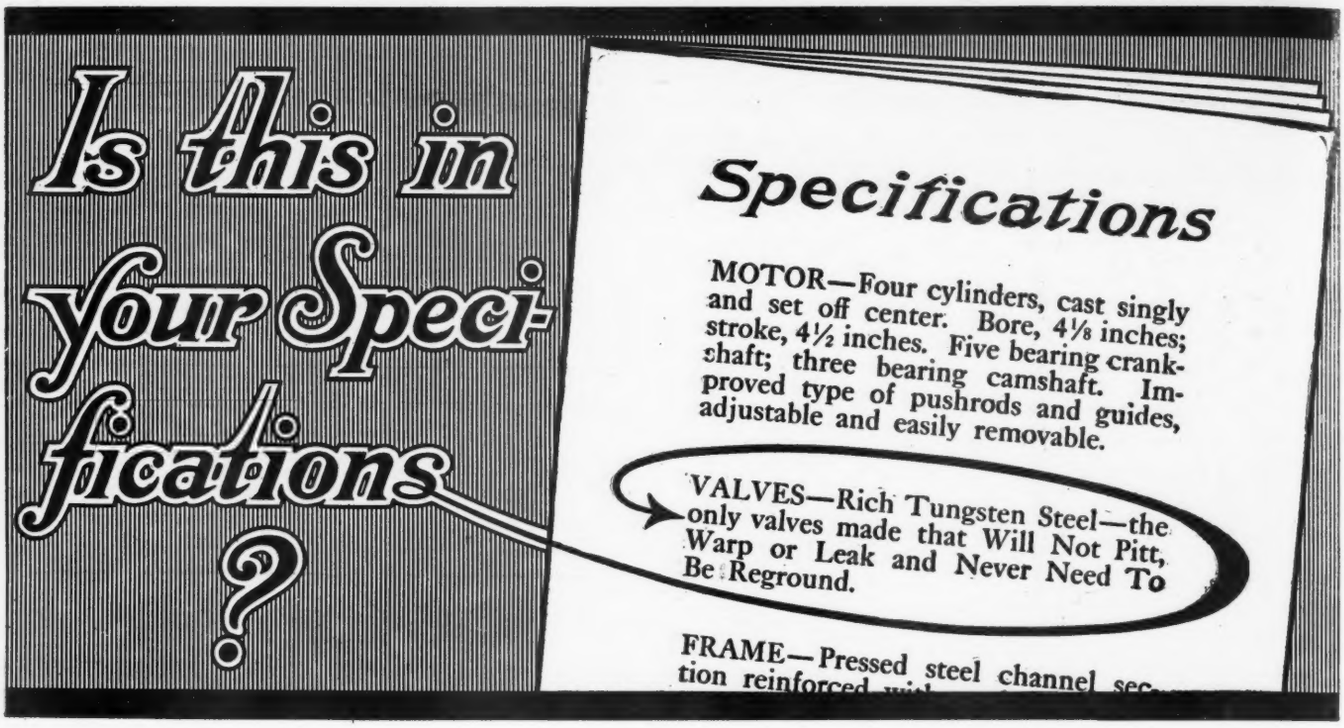
Lovell-McConnell Mfg Company Newark, N.J., U.S.A.

KLAXON

"The Public Safety Signal"

KLAXON

This advertisement planned, written and set up entirely in the Klaxon Factory. Type composition by the Klaxon Press with "Klaxon" type especially designed by Goudy.


Is this in your Specifications?
Specifications
MOTOR—Four cylinders, cast singly and set off center. Bore, 4⅛ inches; stroke, 4½ inches. Five bearing crankshaft; three bearing camshaft. Improved type of pushrods and guides, adjustable and easily removable.
VALVES—Rich Tungsten Steel—the only valves made that Will Not Pitt, Warp or Leak and Never Need To Be Reground.
FRAME—Pressed steel channel sec-
tion reinforced

DO YOU realize the great importance of its being there? Do you realize that a very large percentage of your 1914 customers will be people who have used cars in the past—people who know only too well the troubles, annoyances and constant losses of car service due to the ordinary steel or cast iron valves?

These people are going to look for valve improvements—valves that will not pitt, warp or leak; valves that never need to be reground and always seat properly. To the experienced car user, such valves are more important than a self-starter or column control.

These Leading Car Builders Have Adopted Rich Tungsten Valves

They have foreseen the importance—the demand—these valves will create. Read the names. Note the list includes cars of various classes—from the high-priced to the medium priced. Here they are:

Pierce Arrow	**Chalmers**	**White**	**Garford**	**Cole**
Stutz	**Mercer**	**Mitchell**	**Cartercar**	**Saurer**
Paterson	**Lozier**	**Oakland**	**Oldsmobile**	**Mason**

Not one of these builders adopted them without a rigid test—a test far more severe than any other valve had ever been subjected to. The valves had to prove their worth. They did—beyond all shadow of doubt.

Also Adopted by These Prominent Motor Builders:

Northway Motor Co. Herschell-Spillman Co. International Motor Co.
Wisconsin Motor Co. Dusenburg Motor Co. Rudge-Whitworth Co., Ltd.
Aurora Automatic Machinery Co. (Thor Motorcycles)

Rich Tungsten Valves Will Not Pitt, Warp or Leak and Never Need Regrinding

They are made in one piece, of a dense, tough, special Tungsten alloy steel—the toughest and best heat-resisting metal known. Metal in stem and head has the same heat-resisting qualities, absolutely preventing warping, burning or breaking off of stems.

Send for Interesting Booklet Tells valve facts every car builder should know. A postal brings it. Ask for prices on Rich Tungsten Valves of any size and any quantity.

RICH TOOL CO., 414 Railway Exchange Building, Chicago, Ill.

Jack Frost Puts Weak Batteries Out of Business in Zero Weather

Any Battery will start an engine in warm weather. You want a Battery that will do its work in all kinds of weather.

The

LBA

Storage Battery

has met Jack Frost many times and has always given service regardless of weather conditions

Write us for full information

WILLARD STORAGE BATTERY CO., Cleveland, Ohio

New York Branch: 136 W. 52nd St.
Chicago Branch: 2241 Michigan Ave.
Detroit Branch: 1191 Woodward Ave.
San Francisco Branch: 243 Monadnock Bldg.
Indianapolis Branch: 438 and 439 Indiana Pythian Bldg.

Depots in all Principal Cities in the United States and Canada

(67)

Those who are within the world of Cadillac ownership are enjoying luxuries to which you must remain a stranger so long as you are outside that world

Motoring as you know it, and motoring as the owner of a 1914 Cadillac knows it, are two distinct and different things.

The new Cadillac neither rides nor drives like any other motor car.

It is not that the two speed direct drive axle has changed the principle of the Cadillac engine.

But it has conferred upon it, powers which it did not possess without it.

It has altered the performance—changed the character of that performance—and changed the sensations resulting from that performance.

So, those who are within the world of Cadillac ownership, are enjoying luxuries to which you must remain a stranger so long as you are outside that world.

And they are marked, these differences—these peculiar luxuries of the Cadillac.

So marked, that we doubt if you can drive the memory of them out of your mind after a single ride in the Cadillac.

They are not easy to describe—though you will be conscious of them before the car has travelled half a mile.

But, let us see if we can give you an idea.

You know what the Cadillac—and the Cadillac engine—were before the advent of this 1914 car.

You know that it was notably free from tremor.

You know that it did not lunge forward, but forged forward, majestically, like a battleship.

These were the natural fruits of Cadillac construction—refined and developed to an extraordinary degree.

And now, new qualities and new functions have been conferred upon it, by means of a second—supplemental—principle.

This other principle—the two speed direct drive axle—takes the Cadillac at its high point of development and extends it.

The new Cadillac axle has two direct drive gear ratios.

Eliminating all technicalities from the subject, the advantage of the high direct drive gear ratio consists in the fact that through it, a given speed of the engine produces an increase of 42 per cent in the speed of the car.

Out of this central improvement grow those differences in operation to which we have referred.

Keeping in mind the more slowly moving engine, *you sense at once that infinitely greater steadiness must follow.*

Holding fast to the same mental picture, *you see that vibration must be reduced almost to the vanishing point.*

Imagine the car with the low direct gear, operating at an engine speed of 700 revolutions per minute.

The car will travel 21 miles per hour.

Shift the electric switch and pass into the high direct drive gear ratio, and the speed of the car increases to 30 miles an hour *with no increase in the speed of the engine.*

Unconsciously, when you change gears, you look forward to the apparent effort and labor of the engine to be increased.

It does not come.

The trembling does not come.

No shock, no disturbance is communicated to the car or its occupants.

The steady pressing onward of the car is uninterrupted—the smoothness is continuous.

You forget the engine, you forget the car. There is only quiet—and a soft swinging through space.

Is it any wonder that Cadillac owners are volubly enthusiastic?

They have this velvety mode of travel of which you have yet to learn.

They have attained it by methods which lower the fuel consumption, decrease friction and reduce appreciably the cost of operation.

They have artistic body designs which make it difficult to suggest any sense in which their beauty could be heightened.

They have progressive, scientific engineering development.

They have the certainty of the Cadillac Delco system of electrical cranking, lighting and ignition.

They have the improved Cadillac carburetor, hot water jacketed and electrically heated.

They have entrance and exit for front seat passengers on either side,—right hand drive and right hand control with all of its advantages and no disadvantages.

They have the simple electric switch for shifting from high direct to low direct gear, or vice versa.

They have Cadillac standardization, true alignment and interchangeability of parts.

They have the product of an organization inspired by the highest ideals.

They have the Cadillac glorified and refined.

They have a car entitled to the distinction,
"Standard of the World."

STYLES AND PRICES

Seven pass. car.....$2075.00	Standard Touring Car, five pass....$1975.00 Roadster, two pass. $1975.00	Inside drive Limousine, five pass..$2800.00
Phaeton, four pass. 1975.00	Landaulet Coupe, three pass..... 2500.00	Standard Limousine, seven pass... 3250.00

All prices are F. O. B. Detroit, including top, windshield, demountable rims and full equipment

Cadillac Motor Car Co. Detroit, Mich.

MAXWELL "25-4"

Outdistances All Comers As a Hill Climber

WESTERN UNION NIGHT LETTER Form 2289 B

THEO. N. VAIL, PRESIDENT

RECEIVED AT

6 ARZ 46 N L D 01999

DENVER, COLO., OCTOBER 11TH, 1913

MAXWELL MOTOR CO.,

DETROIT, MICHIGAN

TODAY MAXWELL TWENTY FIVE WON MOUNT FALCON HILL CLIMB BEATING NEAREST COMPETITOR THREE MINUTES. CHEVROLET SECOND FORD THIRD HUPMOBILE FOURTH DISTANCE THREE AND HALF MILES CLIMBED THIRTY TWO HUNDRED FEET OUR TIME ELEVEN MINUTES THIRTY TWO SECONDS MOVING PICTURES MADE BY PATHE WEEKLY FORWARD YOU NEWSPAPERS TOMORROW.

D. S. EDDINS.

234AOCT 13

Maxwell "25"—power and to spare on the level; a winner on the hills; and in the sand—well, it goes through as if there were none

HAVERS SIX

JUST get this thought firmly fixed in your mind—

The 1914 Havers Six-Sixty is the biggest six cylinder value on the market today.

It is a wonder of grace and beauty and power.

And it offers the most complete equipment to be found on any car regardless of price.

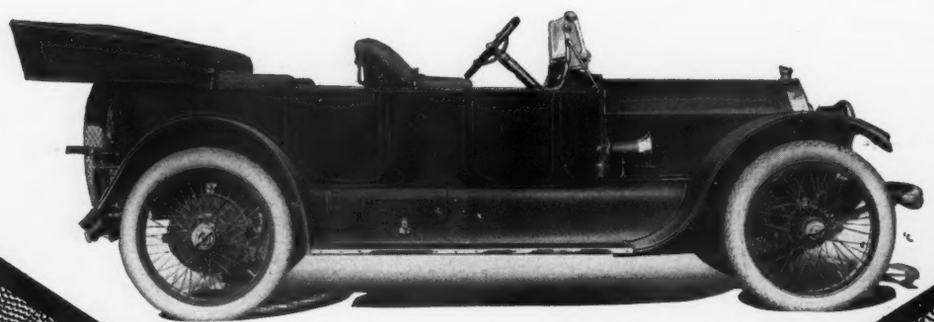
The Havers Six-Sixty is a car of character and distinction.

And the Havers Dealer proposition is being offered only to men of standing and responsibility.

Men who can properly reflect Havers quality—and the Havers spirit—

We have territory available for a few more dealers of this type—

Havers Motor Car Company, Port Huron, Mich.



HAVERS 6-60

128-inch wheelbase — Electric Lighting and Cranking. Price $2485, with most complete equipment ever put on a car as "regular."

6-44—$1985

Four or Five Combination, Phaeton, Touring Body Type

$2975

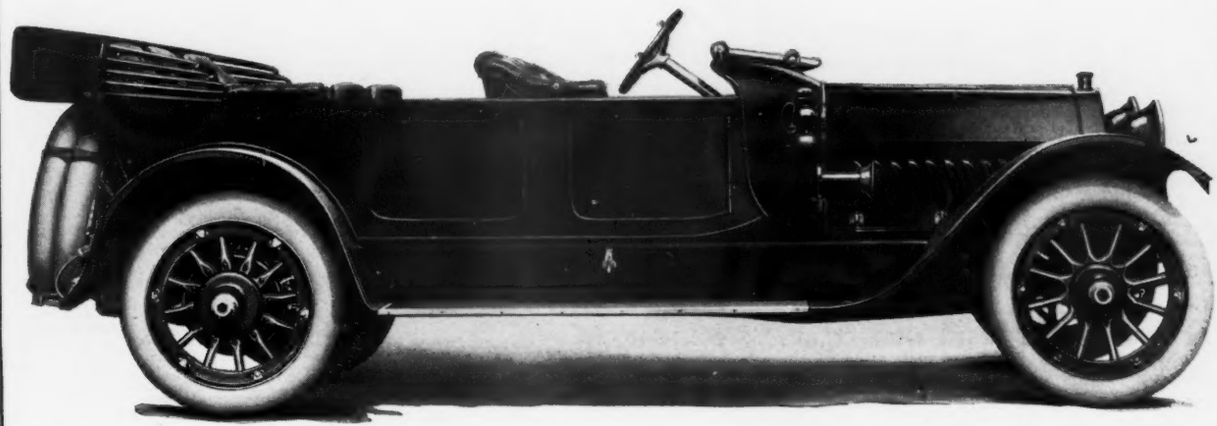
Seven Passenger Touring Body, $175 extra
Limousine $4300

Oldsmobile 1914

Four or Five Combination, Phaeton, Touring Body Type

$2975

Seven Passenger Touring Body, $175 extra
Limousine $4300



Seven Passenger Touring Car, Model 54

Lower in price, and even higher in quality, than any of its predecessors—the Model 54—1914 Oldsmobile—is creating more concrete evidence of live dealers' interest than any other high grade six on the market.

THE PRICE

$2975 practically eliminates competition with dealers handling cars priced from $4000 to $5000—for the Oldsmobile is as good as any of these. The lines of this car are of distinctive Oldsmobile design—a standard which has led all competition, whatever the price.

WE ARE SIX CYLINDER PIONEERS

Oldsmobile pioneered the six cylinder motor, and it is unnecessary to dwell on the value of the years of ripe experience in the manufacture of six cylinder cars—which is back of the Model 54. The Oldsmobile unit power plant 3 point suspension (bore 4¼, stroke 5¼), is a wonderful piece of machinery.

MATTERS OF COMFORT, UTILITY AND REFINEMENT

We learned how to build comfort into the Oldsmobile in the early days of the industry. If we knew of any better equipment or little matters of refinement than are on the model 54 we would be the first to install them; but we have put everything into this car that spells utility, comfort and refinement.

Here are a few of the equipment details—The very latest and improved Delco system of self starting, lighting and ignition. Noil motor driven tire pump. Combination electric and oil side and tail lamps, special Oldsmobile design. Special design Oldsmobile electric head lamps. Special design three-way adjustable ventilating windshield. Top, boot, and patented adjustable side curtains—60 miles speedometer. Adjustable stem setting and winding Waltham clock. Rear tire irons, capacity for two tires. Demountable rims, one extra. Imported horsehair tonneau mat. Electric light in tonneau. Extension electric trouble lamp.

PROMPT DELIVERIES

Never in the history of this company have we been so well prepared to take care of our dealers by prompt shipment of cars as ordered. We began the delivery of our new models August first, and each day sees the regular quota of cars coming through the factory, tested and inspected down to the minutest detail, on schedule time. You can absolutely count on all delivery promises being adhered to rigorously.

WRITE US AT ONCE

In a short while, orders for all cars available for the coming season will be closed, and we shall be unable to go beyond this point. We urge, therefore, that if you wish to sell a car that measures up to the highest standards of quality, workmanship and design, you write us at once, letting us know your prospects, size of territory desired, and your facilities for properly representing the Oldsmobile line. line.

Olds Motor Works :: Lansing, Michigan

Overland $950

Completely Equipped

With Gray & Davis electric starter and generator—$1075
Prices f. o. b. Toledo

Electric head, side and tail lights	Timken bearings	Mohair top and boot
Storage battery and Ammeter	33 x 4 Q. D. Tires	Clear vision windshield
35 horsepower motor	Cowl dash	Stewart speedometer
114-inch wheelbase	Brewster green body with light green striping, nickel and aluminum trimmings	Electric horn
		Flush U doors with concealed hinges

MORE people can afford to buy and maintain a 1914 Overland than any other car in the world.

There are other cars that cost less—but none lasts so long or serves so reliably.

There are other cars that cost less—but none demands so little for upkeep.

Overland 1914 value is ***greater,*** but the price is ***lower*** than ever.

Literature on request. Please address Dept. 46

The Willys-Overland Co.
Toledo, Ohio, U. S. A.

Manufacturers of the famous Garford and Willys-Utility trucks. Full information on request.

Scientific American Reference Book

For 1914

A MODERN BUSINESS NECESSITY

"Those who know the Reference Book will want the new edition at once. Those who do not will save time and money by getting it and learning how to use it."—New York Sun.

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Albany Press:
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"The Book will prove singularly useful as a manual of ready reference."

In this great book are gathered the statistics and information necessary to answer with accuracy the perplexing questions which constantly arise relative to modern processes, discoveries and achievements, and their bearing on our industrial and commercial progress. A great deal of the information it contains can be found nowhere else. The illustrations are not mere pictures but are designed to fix facts and events upon the memory by means of instructive object lessons. In preparing the material for this work its editors have collaborated with the most eminent authorities. Every page has been revised or written by an expert, and the book contains much accurate data that cannot be found in many of the high-priced encyclopaedias.

608 Pages 1000 Ills.
Price $1.50 net

Chicago News:
"One would have to puzzle his brain and perhaps use a microscope to discover some subject not treated here."

Cincinnati Times:
"In all probability there has never been published a book of its kind as thorough and as useful."

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Chapter 1. Population.
Chapter 2. Farms.
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Chapter 6. Mercantile Marine.
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Chapter 9. Telegraph and Cables.
Chapter 10. Wireless.
Chapter 11. Telephones.
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SCIENTIFIC AMERICAN

tells in simple language the things that have made the real history of the world. Today it is bigger, broader and more comprehensive than ever.

The one necessary magazine for the man whose business success depends upon the great mechanical, engineering, electrical and scientific achievements that are rapidly developing the resources of this country and making them of great value to its citizens.

Remember that we have reserved only a limited number of copies of the new 1914 edition of the Reference Book for this purpose and we cannot guarantee to send the book after this supply is exhausted, hence **YOU MUST ACT PROMPTLY. Don't delay—don't miss this chance. Fill in and return this coupon today**

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Send me Scientific American Reference Book and enter subscription for Scientific American as per offer. $3.00 enclosed.

Name.....
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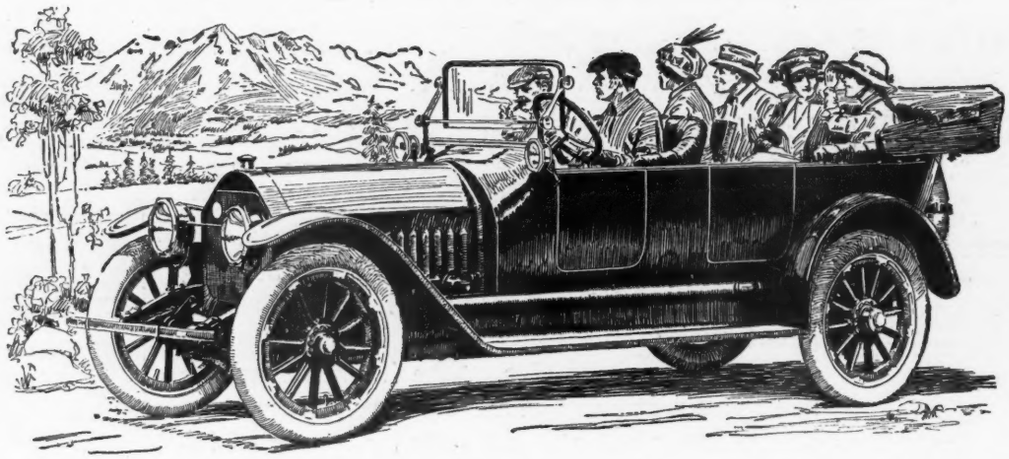
When Writing to Advertisers, Please Mention Motor Age.

A "Six" of unsurpassed ability elegance and comfort



THE seven-passenger KisselKar 60 "Six" easily maintains its leadership as the conspicuous value among big "Sixes." In quality, appointments and performance it is unsurpassed. Only a few of the very highest priced cars can equal the extreme comfort of the big KisselKar 60 "Six." When you ride in it, you experience for the first time the fullest possibilities of balanced automobile construction and the capabilities of a real motor.

KISSELKAR 60 "Six"

A car of remarkably attractive personality. You can't look at this striking "Big Six" without being strongly impressed with its thoroughbred quality. Even when standing quiet at the curb, you feel its power and "sense" its potential ability as a car of the highest type.

The price of the KisselKar 60 "Six" is $3150, fully equipped. Golde patent "one man" top, Warner Speedometer, Klaxon Horn and many other earmarks of de luxe cars are all found in the powerful, silent, smooth-running KisselKar 60 "Six."

The new KisselKar 48 "Six" at $2350 makes a worthy running mate to the "Big Six" and the 40 "Four" at $1850 is a distinct leader in its class.

All KisselKars are fully equipped—electric lighted and started, and have left hand drive, center control. Catalog on request.

KISSELKAR SERVICE CONTRACT

KisselKars are sold under a specific guarantee of service to owners—a written contract that stipulates in detail the mechanical care that forestalls trouble and retards depreciation. The unusual facilities at our Service Stations are always at your disposal.

KisselKar Trucks—six sizes, 1500 lbs. to 6 tons—are used in over 200 distinct lines of business. Ask for Truck Catalog.

Kissel Motor Car Company, 121 Kissel Avenue, Hartford, Wis.

BOSTON, NEW YORK, CHICAGO, MILWAUKEE, KANSAS CITY, MINNEAPOLIS, ST. PAUL, DALLAS, SAN FRANCISCO, LOS ANGELES, OAKLAND, Philadelphia, Detroit, Houston, El Paso, Washington, Baltimore, Nashville, Duluth, Buffalo, Pittsburgh, Hartford, Conn., New Haven, Albany, Troy, Rochester, Providence, Cincinnati, Newark, Montreal, Quebec, Toronto, Winnipeg, Calgary, and 300 other principal points throughout America.

Electric Trucks Give Long Service

RELIABILITY is the keynote of Electric Vehicle design and construction. Note these facts:

There are several Electric Trucks of 1899 model still running.

F. A. Poth & Sons Brewery, in Philadelphia, is using daily an Electric Truck delivered eleven years ago.

Several of the Electric Trucks operated by the New York Edison Company have been in use ten years. An Electric has been used by Frederick Loeser & Company, Brooklyn, for eleven years; another by Stern Brothers, of New York City, for nine years. Three of the Electric Vehicle fleet of Tiffany and Company were delivered to their firm early in 1901. Three of the Electric Trucks owned by Arnold Constable & Company, New York City, were purchased in 1903, and an Electric built for B. Altman & Company in 1898 is regularly used.

The price of electric current for battery charging is constantly decreasing. During the last ten years the average price throughout the United States has decreased over 328 per cent.

The average cost of all Electric Commercial Vehicles preceding 1911 was $3369.72. In 1911 the average was $2465.18—*and the trend is steadily downward.*

You really should investigate Electric Trucks now.

Send for this Book Today "The Story of the Electric Truck"

The facts and figures that you want to know about the Electric Truck are contained in this beautifully printed book of 32 pages—yours on request. Cost of operation—actual photographs of newest model Electric Trucks. Send for it today. Kindly address Dept. M

708

Electric Vehicle Association of America

BOSTON 124 W. 42nd St. NEW YORK CHICAGO

The Borland Electric

5 Passenger Coupe
$2900

Big Business for "BORLAND" Dealers

Here is an electric with individuality, a car distinct in design. Symmetrical, well balanced construction makes the BORLAND Electric Coupe predominant on any thoroughfare.

An electric car has to have something in addition to service built into it; it has to express style, "dash," originality—for therein does the owner take the greatest pride.

The BORLAND Coupe has all of these requirements. There is nothing cramped, pudgy nor top-heavy in the appearance of the BORLAND Coupe. Note its pleasing body lines, the long, graceful sweep of the fenders; the ample "sprawl room"; perfect proportion between the height and length of the car.

SPECIFICATIONS: Horizontal control from either forward or rear seat, six forward and three reverse speeds; automatic cut-out disconnects power when emergency brake is applied; 40 cell "Exide" batteries; standard makes of cushion tires or special pneumatic tires optional; anti-skid chains, tools, silk umbrella, etc. Price, $2900.00.

Send for BORLAND Poster Booklet.

The Borland Electric

The Aristocrat of Electric Roadsters

The clean-cut lines and aristocratic appearance of the BORLAND Roadster are in great measure responsible for its popularity with professional and business men.

This roadster is also a great favorite with women drivers who prefer a "mannish" car built along gas car lines—yet a safe car, easy to operate and control.

SPECIFICATIONS: General Electric motor, specially built for us to withstand a 500% overload. General Electric non-arcing controller with 6 speeds forward and 3 reverse. Interlocking device attached to brake to cut off current when brake is applied. Current remains cut off until Control Lever is returned to neutral position after emergency brake is released. Control, side-lever type. Wheel base, 96 inches. **BATTERIES:** 42 cells, 11 plate "Exide."

EQUIPMENT: 1 pair non-skid chains, hydrometer, odometer, pneumatic tires, 34x4, or standard makes of cushion tires, top slip-covers, tools, etc. Price $2550.

Complete Descriptive Literature on Request.

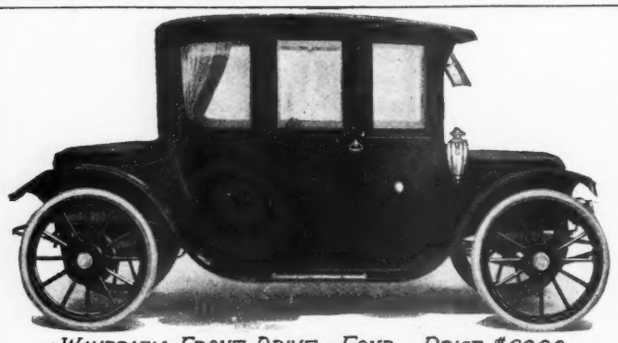
Gasoline Car Dealers: Prudent dealers are no longer handling gas cars only. They are rounding out their line by taking on the BORLAND Electric. They are doubling their sales possibilities.

Our national advertising campaign, directed at over 4,000,000 readers every month, is sending the prospects to our dealers. If you are located in a live town or city we have an interesting proposition to make you. Write or wire us—your territory may still be open.

THE BORLAND-GRANNIS COMPANY
310 E. HURON STREET **CHICAGO, ILLINOIS**

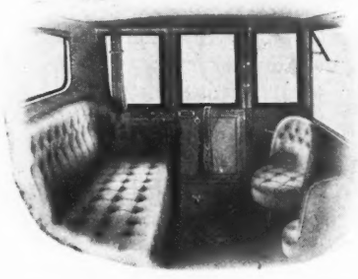
Model 52
Roadster
$2550

THE Waverley SILENT Electric



WAVERLEY FRONT-DRIVE-FOUR PRICE $2900

INTERIOR FRONT-DRIVE-FOUR



INTERIOR REAR-DRIVE-FOUR PRICE $2800

INTERIOR-FRONT & REAR-DRIVE BROUGHAM PRICE $3000

FASTIDIOUS REQUIREMENTS MET IN THE 1914 WAVERLEY

THE reasonable requirements of your fastidious customer will be found—where else, if not in a Silent Waverley.

WAVERLEY FRONT-DRIVE-FOUR—The classic lines, the approved dignity, the comfortable seating arrangement, the luxurious furnishing, the unrivalled spring suspension of the Waverley Front-Drive-Four—these are reasonable requirements, and yet where else will you find them all combined except in the Silent Waverley?

Take note of a single detail. The driver's seat revolves, permitting its occupant to leave or enter the car by the left hand door without disturbing the other passengers—significant of the care with which the fastidious customer's taste has been consulted in the 1914 Waverley.

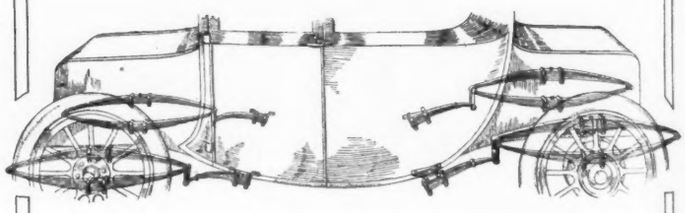
WAVERLEY REAR-DRIVE-FOUR—Has your customer a preference for the sociable rear seat drive—a natural preference to which he has a perfect right? Where else will he find so wide a choice in seating arrangement? The Silent Waverley Rear-Drive-Four offers two—the usual arrangement of two double seats placed vis-a-vis, and the different plan shown in the illustration—a double rear seat with two revolving chairs in the right and left front corners.

WAVERLEY FOUR-CHAIR-BROUGHAM—These are both very practical and deservedly popular seat plans; but there is still another, that of the Silent Waverley Four-Chair-Brougham, the sociable car supreme, where the usual rear seat is divided into three separate, luxuriously upholstered chairs, the middle one placed slightly behind the other two for the sake of extra seat space (61 instead of 52 inches). The driver occupies the left hand chair with no one sitting in front of him and the fourth passenger has a folding chair in the forward right hand corner. This is the Waverley designer's happy arrangement to meet the very particular requirements of your *MOST* fastidious customers. Where else will you fiind its equal?

WAVERLEY BROUGHAM FRONT AND REAR DRIVE—Or again is your customer in doubt, as he has a right to be? The Silent Waverley Front and Rear Drive Brougham will give him the dual control preferred by some—the privilege, that is to say, of driving from either front or rear seat.

WAVERLEY LIMOUSINE-FIVE—For the customer who requires a larger car there is the Silent Waverley Limousine-Five, the electric de luxe, where the driver has not only a separate seat with full view ahead, but even a separate door for his special use.

The Silent Waverley Electric is so far from being a "standardized car" that every special need of the most fastidious purchaser will be found in one of its several different models.



SPRING SUSPENSION

THE Waverley SILENT Electric

SEVENTEEN YEARS OF LEADERSHIP

BEHIND the name, the Silent Waverley, is an interesting story—a story of leadership in every department of coach design and electric engineering.

WAVERLEY—THE PIONEER ELECTRIC

The electric exhibited at the first American show
The first electric with direct geared drive
The first electric with successful shaft drive
The first electric coupe
The first electric limousine
The first electric with full view ahead
The only electric with four separate chairs
The only electric with low center of gravity
The only electric with low entrance
The only electric with long wheelbase
The only electric with no battery under seats or floor

The Silent Waverley has been not only the pioneer electric in every forward movement—it has seen many of its features first condemned then imitated in practice.

WAVERLEY HERRINGBONE GEARS—From the first the Silent Waverley Electric has been equipped with Herringbone gears while many experiments have been made with chain drives, bevel gear shaft drives and worm gears.

Nevertheless, the highest authorities among gear experts have continued to maintain that for strength, quiet running qualities and high percentage of efficiency, the Herringbone gear is the best of all gears.

Efficiency tables put out by leading parts manufacturers of bevel and worm gear drives show the lower the horsepower the lower the efficiency, and compared with the gas car the electric is always a machine of extremely low horsepower. The efficiency of Herringbone gears shown by test in Silent Waverley Electrics is 98.7 per cent., the same as in a 40 or 4000 horsepower transmission.

Waverley gears have been right from the start while experimenters have been shifting from one form of drive to another.

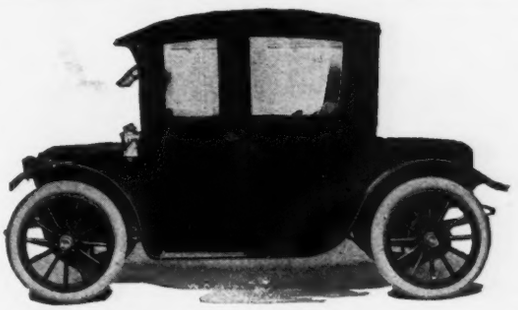
WAVERLEY, FULL ELLIPTIC SPRINGS—In its spring suspension as well as in its power transmission the Silent Waverley leads all other electrics. Full elliptic springs with torsional supporting side springs, as applied in the Waverley, insure greater riding ease than will be found in any motor vehicle, choice of solid, cushion or pneumatic tires.

If you, Mr. Dealer, are thinking of adding an electric to your present line of gas cars you will make no mistake if you investigate first and foremost the Silent Waverley Electric. We are not cutting our commission to dealers.

THE WAVERLEY COMPANY
100 South East St., Indianapolis, Ind.

Chicago Branch
2425 Michigan Ave.

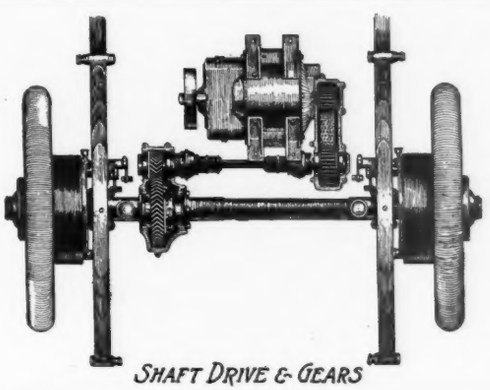
New York Office
1922 Broadway



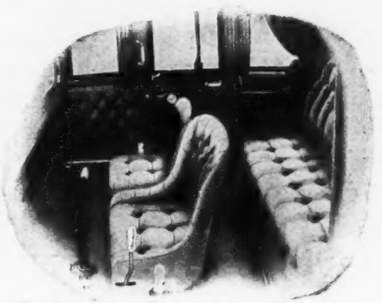
WAVERLEY FOUR-CHAIR-BROUGHAM PRICE $3150

INTERIOR FOUR-CHAIR-BROUGHAM

WAVERLEY LIMOUSINE-FIVE PRICE $3500



SHAFT DRIVE & GEARS



INTERIOR LIMOUSINE-FIVE

The Battery Limit of Your Electric Should be Checked by the Stewart Hub Odometer

WHEN you know that the battery in your electric pleasure car is fully charged you are only half informed. You must also know how many miles that charge will carry you—how much of a trip it is safe to take. You must measure the ***mileage*** capacity of your battery with the

Stewart Hub Odometer

Read your Stewart Hub Odometer after your battery has been given a full charge. Then read it again when that charge is nearly exhausted. The difference between these two readings will show how far you dare take your car each time in the future. Make the Stewart tell you whether your electric is giving you the mileage promised by the manufacturer—not just at first, but month in and month out.

This is the most essential duty the Stewart Hub Odometer has to perform on your electric ***—and the principal reason why it must be there.*** But it does other important things.

It checks off your tire wear—in miles—the only measure that the tire manufacturer recognizes in making good his guarantee. It tells you how far you have traveled each season; it gauges the durability of your car itself and of each of its parts. Its cost is but $15 complete.

You cannot drive your electric with assurance and economy unless it is Stewart equipped. Be sure that there is a Stewart Hub Odometer on your new car when you buy it—or that one is placed without delay on the car you now own.

The Stewart Speedometer Factory, 1931 Diversey Blvd., **Chicago, Illinois.**

Stewart-Warner Speedometer Corporation

The world's largest manufacturers of speedometers for automobiles, motorcycles, motor boats, aeroplanes, cream separators and commercial vehicles.

The GREATEST INDUSTRIAL MAGNET

Draws the Friction From the Wheels of Industry

HESS-BRIGHT
Annular Ball Bearings

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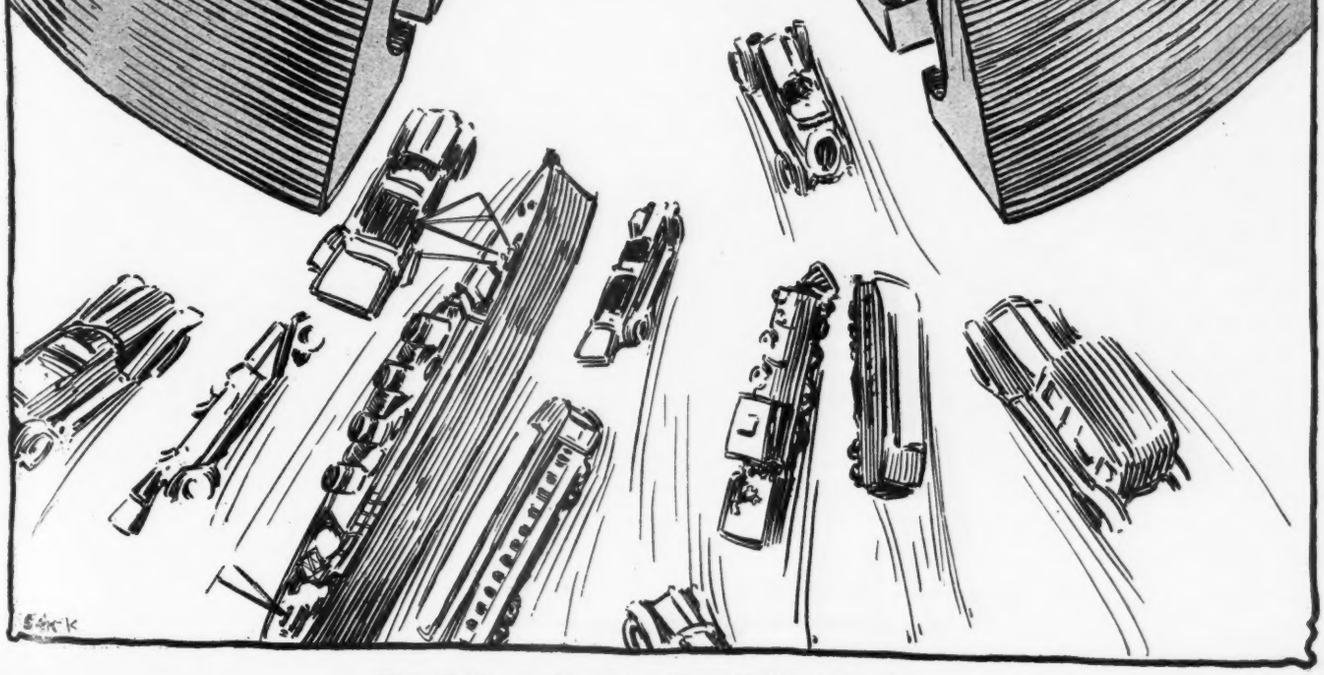
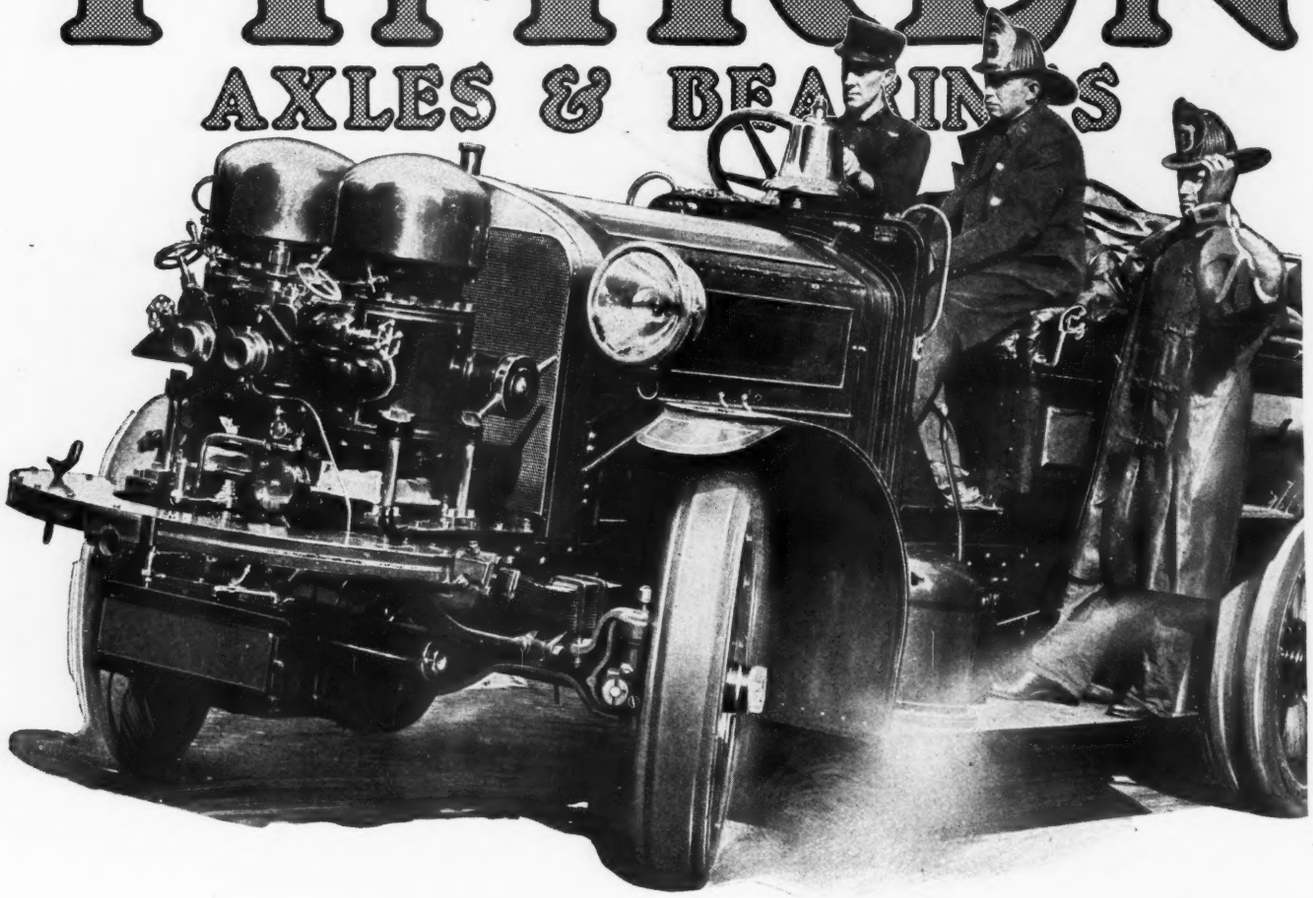
Front St. and Erie Ave. on N. Y. Div. of Pa. R. R.
PHILADELPHIA, PA.
Stores for Retail Distribution:
PHILADELPHIA:
666 N. Broad Street
NEW YORK
1974 Broadway
CHICAGO:
1800 Michigan Ave.



TIMKEN

AXLES & BEARINGS



Out For Hard Service

CLANG the gong! Clear the streets! Rush over car tracks! Swing round corners! Take the shortest road no matter how rough! Put on full speed—get to the fire!

Human life is at stake—and property—perhaps the whole town.

Weight on the fire truck is heavy—pumps, hose, ladders and men—and speed is of utmost importance. Nothing can cause delay. The fire truck *must* be dependable. And the foundations of dependability are the axles and their bearings.

Wheel bearings are the buffers that meet the intense shocks, stresses and vibration as the massive engine plunges over rough pavements in its dash to the fire.

They must be better than good bearings, they must be the very best. Bearings that will carry tremendous loads, and in *addition* will meet the severe side-pressure when the heavy engine swings suddenly round a corner.

The Timken Tapered Roller Bearing is the one bearing that meets and withstands *both* these forces. That is why practically all successful builders of fire apparatus have adopted Timken Bearings.

The ponderous weight rests, too, on these bridges of heat-treated steel, the axles.

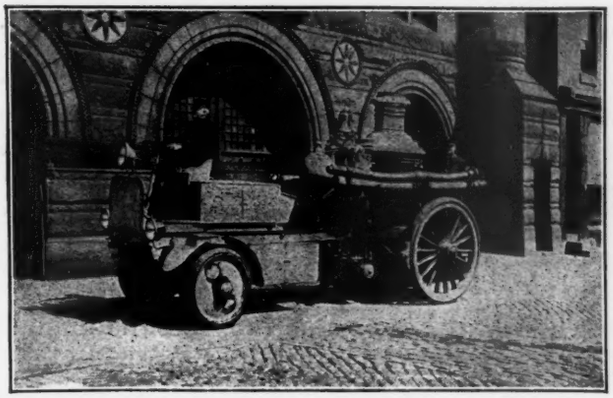
Head on the Timken-Detroit Front Axle meets every shock and jolt. The gears of the Timken Jack-Shaft transmit the power of the huge engine full force to the chains that drive the rear wheels.

Timken Radius Rods take the tremendous thrust between jack-shaft and rear axle. Their swivel connections enable the plunging vehicle to adjust itself to all unevenness of the road They supply compensation for every stress from every possible direction.

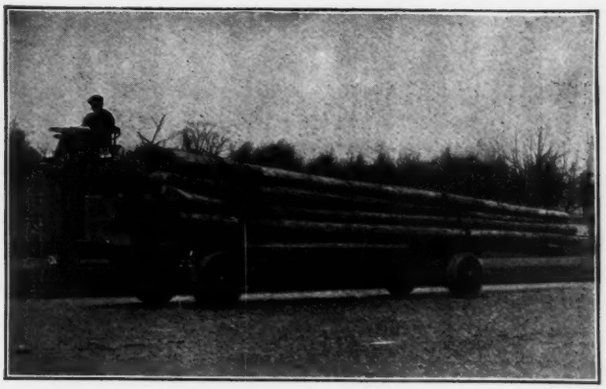
THE TIMKEN ROLLER BEARING CO., CANTON, OHIO
THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.

TIMKEN-DETROIT axles are designed for the *extra* stresses that emergencies bring. Builders of trucks which have extra hard duty to perform turn naturally to Timken Axles and Bearings. Their uniform success under the most severe conditions of motor-car service—pleasure and commercial—has been unparalleled.

YOU can learn more of what good bearings and axles mean, of what Timken stands for in good motor-car construction, by writing for the Timken Primers, T-7 "On the Care and Character of Bearings," T-8 "On the Anatomy of Automobile Axles."



Electric Tractor applied to fire engine, owned by the City of Philadelphia, equipped with 88 cells, type MV-11, "Ironclad-Exide" Battery.



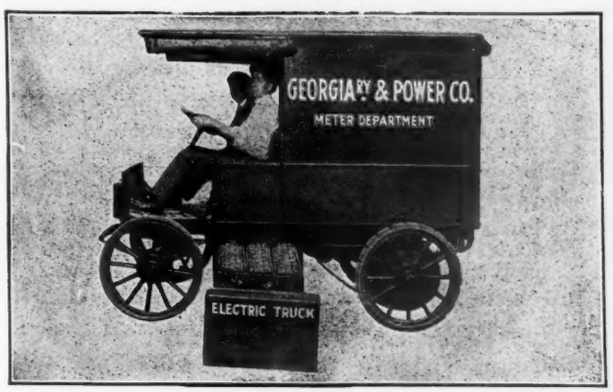
Six ton electric pole truck owned by the Philadelphia Electric Co., equipped with 42 cells, type MV-21, "Exide" Battery.

Built for the Efficient and Economical Operation of Electric Vehicles

The 4 "Exide" Batteries

"Exide", "Hycap-Exide", "Thin-Exide", "Ironclad-Exide"

Designed to meet the demands of all types of "Electrics"
Used by the largest electric vehicle users
Let us tell you who they are



Electric delivery wagon owned by The Georgia Railway & Power Co., Atlanta, Ga., equipped with 44 cells, type MV-7, "Ironclad-Exide" Battery. This car ran 24,000 miles in 19 months and was only out of service *two* working days.

Five ton ice truck and trailer. The truck is equipped with 44 cells, type MV-31, "Thin-Exide" Battery. This truck hauls from 50 to 60 tons per day over the hills of Cincinnati.

THE ELECTRIC STORAGE BATTERY CO.

MANUFACTURER OF

The "Chloride Accumulator", The "Tudor Accumulator", The "Exide", "Hycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries

New York Boston Chicago St. Louis Cleveland Atlanta Detroit

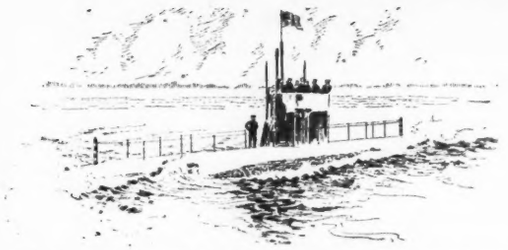
PHILADELPHIA, PA.
1888—1913

Denver San Francisco Seattle Los Angeles Portland, Ore. Toronto

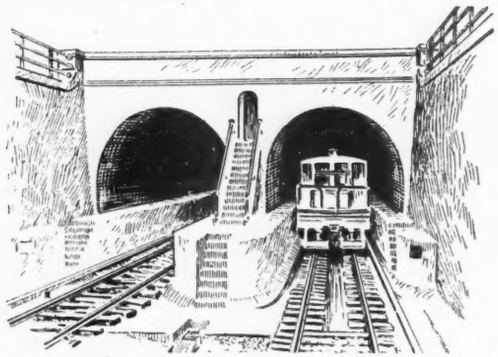
886 "Exide" Distributors 9 "Exide" Depots "Exide" Inspection Corps

GOULD VEHICLE BATTERIES

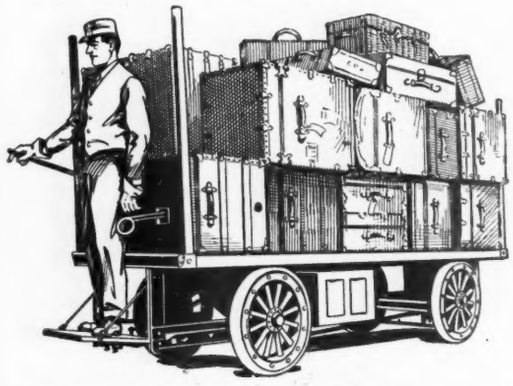
Chemically Powerful Mechanically Strong



The fully charged Gould Storage Battery of a submarine vessel in our navy has enough power to drive 130 automobiles 100 miles. The Russian, Austrian and Japanese navies have similar installations.



Every Michigan Central train that goes through the Detroit River Tunnel depends upon a Gould Storage Battery for power. This battery is large enough to keep 300 automobiles running 100 miles every day.



Baggage on the station platforms of the Pennsylvania Railroad and Grand Central Terminals, New York, is handled on trucks driven by Gould Vehicle Batteries.

Gould *Vehicle* Batteries were designed by the same brains and with the same facilities that made the Gould triumphs indicated by illustrations herewith.

The strong friendship of experienced electric vehicle users for the Gould Battery comes from the economical and dependable service assured by our simple construction and by our provision for continued high electrical capacity.

The Gould positive plate construction produces high energy output per unit weight of battery, and does so through the use of a *hard* oxide composition that absolutely prevents the troubles common to the usual *soft* paste composition. The active particles, being better bound into the plate, *must* do maximum work before shedding, especially that only a thin surface layer, instead of the whole mass of oxide, becomes active to produce full electrical capacity. *Much longer plate life* is thus secured through slower natural wear, immunity to shedding from jarring and vibration of the vehicle, and less harm from too long or too rapid charging.

This has been proven time and again where Gould plates have been used for renewals in batteries of other make. Almost invariably renewal with Gould plates increases the service radius of a vehicle and cuts maintenance cost to the low limit.

AN AGENCY OPPORTUNITY FOR DEALERS and CHARGING STATIONS

Gould Vehicle Batteries and renewal plates (which fit jars of any make) quickly establish a reputation which makes subsequent sales come easy. Our liberal treatment of customers further tend to play into our representatives' hands and make an agency for Gould Batteries extremely desirable. Our proposition would enable you to make good money. Ask for particulars.

Gould Storage Battery Co.

General Offices: 30 East 42nd St., New York City. Works: Depew, New York

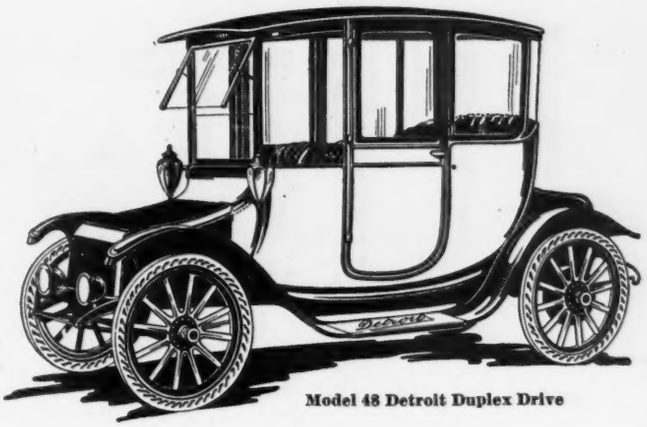
BOSTON—89 State Street **CLEVELAND—American Trust Bldg.** **CHICAGO—The Rookery**
PHILADELPHIA—613 Betz Building **DETROIT—999 Woodward Avenue** **SAN FRANCISCO—904 Rialto Bldg.**
AGENTS: Topeka, Los Angeles, Seattle. **Canadian Representative: R. E. T. Pringle, Montreal, Toronto, Winnipeg, Vancouver**

83

THE Detroit ELECTRIC

1914 Features

- Choice of worm or bevel gear
- Detroit Duplex Drive
- Electric Hand Brake
- Longer Wheel Base
- 12 ft. shorter Turning Radius
- Larger Tires
- Larger Brakes
- Increased Battery Capacity (Washing unnecessary)
- All battery cells accessible by raising hoods
- Hanlon Patented Rain Vision Wind Shield
- More exclusive appointments
- Deep Turkish Cushions



Model 48 Detroit Duplex Drive

DEALERS: Your Detroit Electric Sales Are Not Limited

Eighty per cent of all electric car owners belong to the well-to-do "middle class" of American families. They drive no other car. Their electric is the family car in constant use from early morning till late at night—winter and summer.

The popularity of the electric is gaining ground daily and *sales possibilities are unlimited.*

Detroit Electric Agency Openings Becoming Scarce

Now—not next year—is the time to get into the electric automobile business right. We have a few cities open. They will not be open long. We want the best dealers in these cities. As a class, Detroit Electric dealers represent the most substantial men in their respective communities. This type of men we want in *every* city. Only *permanent* representation is desired. We are in position to furnish such dealers sales helps of an unusual character, drawn from years of experience in every part of the country.

Large Volume Lowers Prices

For 1913 Detroit Electric dealers sold *double* the aggregate number of pleasure vehicles that the dealers of any other manufacturer sold. Our plans for 1914 are on a still larger scale. Our large volume enables us to make *better* cars than ever and to sell them at *less* money than ever. A small volume would make it necessary—with the improvements we have added for 1914—to list our cars at from $350 to $400 more than our 1914 prices.

Keep in mind the fact that we build the finest electric cars made and then compare the following prices with those asked elsewhere:

1914 Detroit Electric Prices

With Bevel Gear Axle		*With Worm Gear Axle*	
Victoria	$2300	Gentleman's Roadster	$2500
4-pass. Brougham, Rear Seat Drive	2550	4-pass. Brougham, Rear Seat Drive	2850
5-pass. Brougham, Front Seat Drive	2800	5-pass. Brougham, Detroit Duplex Drive	3000

(Prices f. o. b. Detroit)

If our policy of doing business appeals to you as being right, and offering the greatest possibilities for the future, we should be glad to hear from you. Gas car dealers or electric car dealers handling other lines are invited to get in touch with us.

Anderson Electric Car Company, Detroit, U. S. A.

BUILDERS OF "THE DETROIT ELECTRIC"

Largest manufacturers of electric pleasure vehicles in the world.

R·I·V
Ball Bearings

IMPORTED
Since 1904

Quality

R. I. V. CO.
1771 B'way, N. Y.

A Valuable Introduction

R. I. V. Imported Ball Bearings are a valuable introduction of any product. Their adoption means on the part of the maker a recognition of the fact that "The Best Is Cheapest in the End."

Manufacturers and Dealers alike want in their car bearings that will help sell them — smooth-running, durable, economical, efficient bearings—for upon bearing efficiency depends the satisfactory and quiet operation of any car, gasolene or electric.

There is an R. I. V. for every need and no high-class maker can afford to omit them.

40 AUTOMOBILES TRAPPED ON RAILS; HUNDRED IN PERIL

One Vehicle Crashes Through Grade Crossing Gate and Others Follow.

SPECTATORS WARN OF APPROACHING TRAIN

Broken Arm Is Lowered, but Men Raise It to Allow Automobiles to Escape.

More than one hundred persons in thirty or forty automobiles were thrown into a panic last night at the Mott avenue crossing of the Long Island Railroad at Far Rockaway, when a crowded automobile bus broke through the lowered gates in front of an approaching train and was followed by a score of other automobiles while the frantic gate tender raised and lowered the remaining arm helplessly. One automobile was trapped on the rails by the descending arm and its occu-

These Brakes were Insufficient

SHELDON

MEANS CERTAINTY

Pages and pages have been written about the safety of this or the necessity of that accessory or equipment on a motor vehicle but in the last analysis the entire efficiency of that vehicle depends upon ITS BRAKES.

The safety of the truck, the operator, and the public is no more certain than the strength of those brakes. Over treacherous grade crossings—down winding hills—through congested city traffic—what does a driver depend upon to a greater extent than the brakes? Yet it seems that the average buyer pays very little attention to this vital factor in a motor vehicle.

You should know that SHELDON BRAKES offer the utmost protection that it is possible to obtain.

You should know that SHELDON BRAKES are as nearly infallible as hand, brain and machinery can make them. The most dangerous courses anywhere have no terrors for a SHELDON-EQUIPPED car.

Every SHELDON BRAKE bears the mark of perfection before it leaves our factory.

Primarily its design is the most efficient in the world. SHELDON 3-ton brakes will skid the wheels with a 4½-ton load on a 30% grade. Its thoroughness in the matter of materials and construction is so sufficiently well known to engineers that to most of them "SHELDON" is synonymous with "SAFETY."

You can do no better than to specify SHELDON DOUBLE BRAKE REAR WHEEL EQUIPMENT.

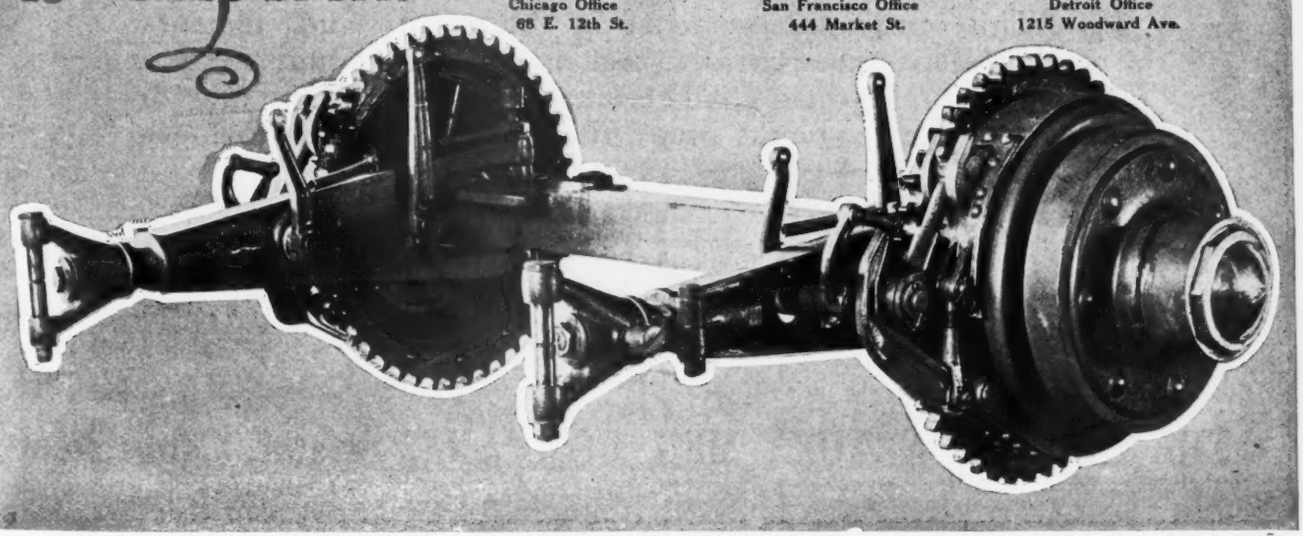
Then you'll be certain that YOUR TRUCK IS SAFE—ANYWHERE—EVERYWHERE—ALWAYS.

The SHELDON Brake Equipment is Supreme

SHELDON AXLE CO.

WILKESBARRE, PA.

Chicago Office 68 E. 12th St.
San Francisco Office 444 Market St.
Detroit Office 1215 Woodward Ave.



New Departure Ball Bearings

AMERICAN-MADE FOR AMERICAN TRADE

The Proof of the Bearing is in its Service

The garage man knows better than anybody the comparative service merit of the bearings installed in motor cars he cares for and repairs.

We recently sent out letters to garage men throughout the country, asking their opinion of New Departure Ball Bearings, based on their experience with it.

The complete summary of all responses received the first week shows that 96 per cent of the garage men who have been using New Departures found them absolutely satisfactory. Many of them went so far as to say that it proved superior to all others.

This remarkable evidence of the quality and efficiency of New Departure Ball Bearings is absolutely indisputable. Users of foreign-made ball bearings, whether garage men or manufacturers, should give this American-made bearing a thorough trial.

Every manufacturer, purchasing agent, superintendent, and designing engineer, should have the Engineering Edition of the New Departure Ball Bearing Catalog and the brochure on "Bearing Friction and Its Elimination."

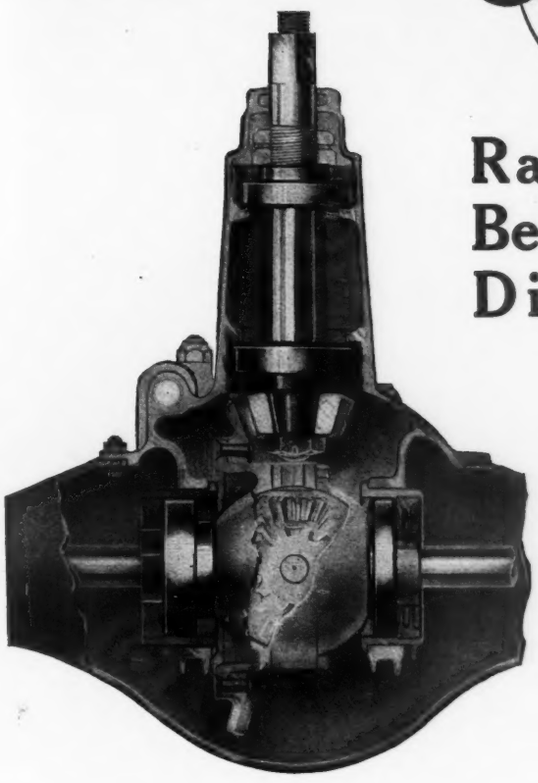
Every garage proprietor, and superintendent should have the new Ball Bearing Garage Manual now in its third edition. Either, or all of these books, will be sent free, on request. Drop us a line now.

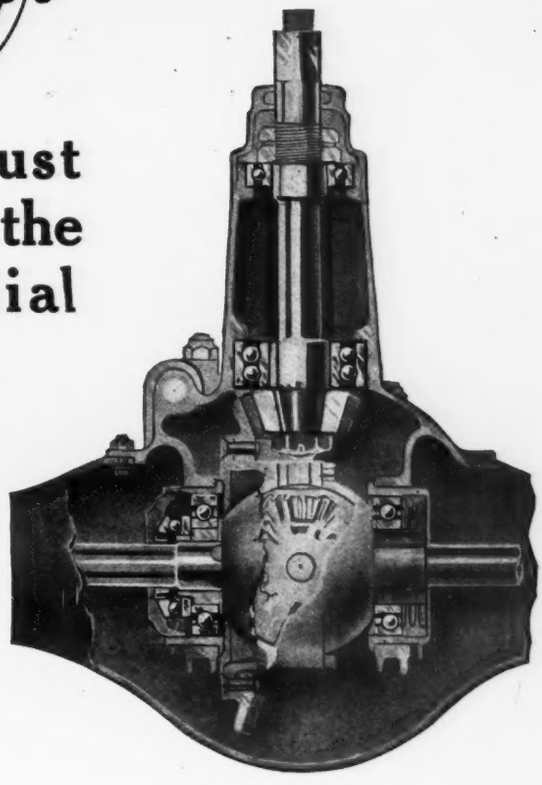
THE NEW DEPARTURE MFG. COMPANY, Bristol, Connecticut

Western Branch, 1016-17 Ford Bldg., Detroit

CAPACITY
GURNEY
ENDURANCE

Radio-Thrust Bearings in the Differential





¶ We show above several Radio-Thrust substitutions as applied about the differential.

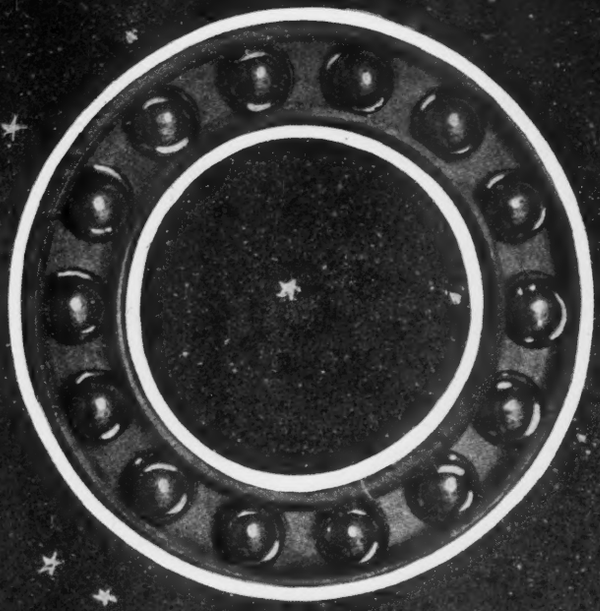
¶ An R-T Bearing (wide type) in place of a radial and a thrust bearing back of the large bevel gear, and a narrow type R-T opposed thereto in the place of an ordinary annular on the other side of the differential.

¶ An R-T Bearing (wide type) in place of a double row annular back of the pinion with another R-T opposed thereto supporting the other end of the pinion shaft.

¶ The simplicity of this construction needs no comment. Each bearing is subject to both radial and thrust loads, and each has the needed capacity thrust as well as radial to safely and easily take care of any stresses that any emergency may impose upon it. The distinctive point in these bearings is that the particular sort of loads that the several bearings are subject to are in each case merely normal loads, just what the bearings are designed to carry. In other words, we think it is the logical and rational thing to adapt the bearings to the character of the service. Hence the Radio-Thrust Bearing. It makes Gurney capacity and endurance available in every bearing of the car.

Gurney Ball Bearing Company

Jamestown, N. Y.



Star

Outshines Them All!

The Famous, Perfect, BALL RETAINERS

Because it is made of one piece and very light, it is used in connection with thrust bearings giving the most efficient results. Let us quote you on complete thrust bearings for your requirements. Send us your blue prints.

Star Ball Retainer Co., Lancaster, Pa.

89-I

When Writing to Advertisers, Please Mention Motor Age.

"AS SURE AS THE WHIRL OF THE WORLD"

WOMEN WON'T WORRY

Women won't worry if their cars are equipped with Auto-Lite starting motors and lighting generators. They are an open-sesame which removes the last obstacles from the pleasant and successful operation of gasoline motor cars by women—eliminating muscular effort and placing completely within their control the most powerful machines.

The Auto-Lite Starting Motor will turn an average engine faster than 100 revolutions per minute; compelling positive starting.

The Auto-Lite Generator, automatically, furnishes an abundance of electric current—enough to charge the storage battery and keep the lamps burning brilliantly.

Every Owner Should Have This Book

"Handbook on Care and Operation of Modern Electric Systems" so full of interesting information on all modern electric systems that no automobile owner can afford to be without it. Explains, in detail, functions of the various parts—how to locate and remedy troubles of all kinds—embraces all electrical automobile systems. The large operation chart which it contains is alone worth the price. Regular price, 50c. Will be sent to you for 10c. in stamps if you use this coupon.

"The Pioneer Makers of the 6-volt Electric System"

THIS COUPON SAVES YOU 40c.

The Electric Auto-Lite Co.
112 Michigan St., Toledo, Ohio

Enclosed find 10c. in stamps for which please send me your handbook.

NAME_____

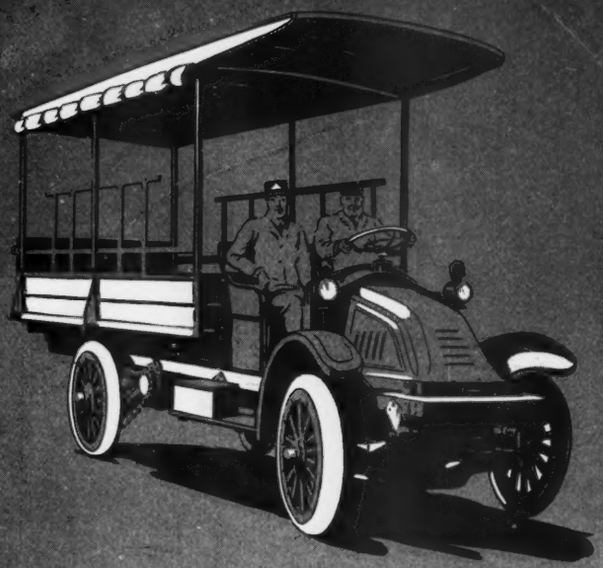
ADDRESS_____

THE ELECTRIC AUTO-LITE COMPANY

TOLEDO, OHIO, U.S.A.

BRANCHES

NEW YORK KANSAS CITY SAN FRANCISCO DETROIT



Make Trucks Pay—Use

Polarine

FRICTION REDUCING MOTOR OIL

Keep them busy, and properly LUBRICATED.

Polarine is made in ONE GRADE that lubricates **every type** of motor in every kind of car or truck.

It maintains the correct lubricating body at any motor speed or heat, and flows perfectly in zero weather.

It keeps every friction point protected with a durable slippery film. Millions of parts have run for years on Polarine practically without wear.

The World's Oil Specialists make it after 50 years' experience with every kind of lubricating problem and a study of all makes and types of cars.

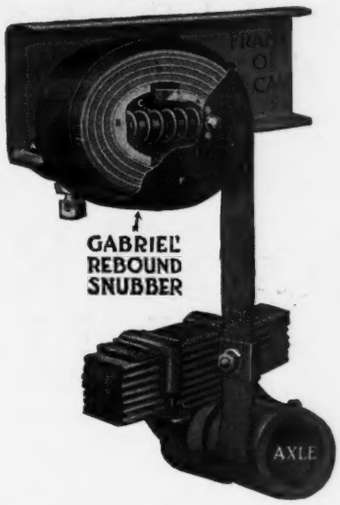
Polarine is worth to you **many times its cost,** because it stops the **largest** part of **motor truck depreciation.** Try it for three months and note the saving in repairs.

STANDARD OIL COMPANY

(AN INDIANA CORPORATION)

Makers of Special Lubricating Oils for Leading Engineering and Industrial Works of the World

(104)



Easy for anyone to put on. No drilling or marring the car. Nothing to work loose, wear out, get noisy or need re-adjustment. Snubbers do not stiffen the springs; they merely *control* them, preventing *abrupt* or *extreme action*. They retard only the up-stroke, reduce the recoil and minimize all road shocks.

Live Agents Wanted

More 1914 Cars Will Carry GABRIEL REBOUND SNUBBERS Than Any Competing Device

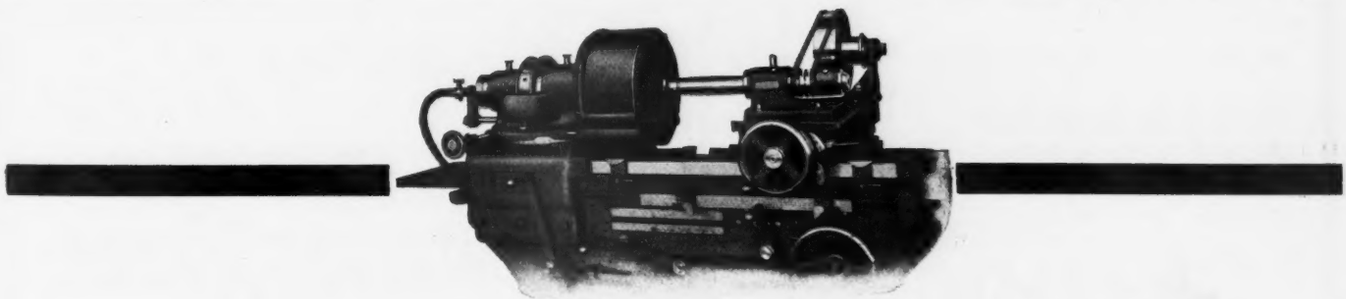
Peerless *White*
Oldsmobile
Stearns *Lozier*

—all use Gabriel Rebound Snubbers as standard factory equipment; others use them as Standard on certain models and other prominent makers use them in large quantities as special equipment.

Gabriel Rebound Snubbers now lead in numbers of cars equipped, just as they have always led in reducing upkeep expense, increasing riding comfort and prolonging the life of motor cars.

Gabriel Horn Mfg. Co., 1415 East 40th St., Cleveland, Ohio

Makers of the famous GABRIEL Musical Horns and Auto Accessories



SIMPLICITY & HANDINESS

Accessibility of the work at **all times,** together with **simplicity** of construction and operation, are features of the greatest value in the production of high grade work at **a low manufacturing cost.**

Moreover, in these present days, when **expert** workmen are so difficult to obtain, the number of parts which must be kept in perfect condition should be reduced to the minimum.

HEALD INTERNAL GRINDING MACHINES

were designed with these important points constantly in mind as the finished machine proves.

Everything about this machine is as simple and handy as we know how to build.

Fifteen combinations of speeds and feeds are at the command of the operator without moving from his position in front of the machine.

Special machines for special work is the modern method. The simpler the operations and the simpler the apparatus for producing the work, the more satisfactory, both mechanically and financially, the results will prove.

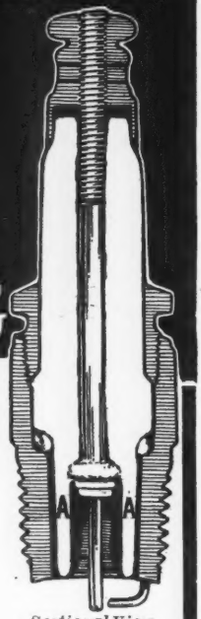
If your work necessitates Internal Grinding, investigate the "HEALD" thoroughly.

Your first step should be to send for "PRACTICAL HINTS ON INTERNAL GRINDING," a book you would be willing to pay a quarter for, free for the asking.

THE HEALD MACHINE COMPANY

26 NEW BOND ST. **Chicago Office, 24 So. Jefferson Street** **WORCESTER, MASS.**

Special Announcement
Mezger Plug becomes the
J-M (MEZGER) SOOT-PROOF SPARK PLUG



Sectional View Note porcelain "petticoat" AA, extending to end of chamber

In future the famous Mezger Soot-Proof Plug will be known as the **J-M** (Mezger) Soot-Proof Spark Plug, and sold exclusively by this company.

This is the **only** absolutely **soot-proof** Spark Plug on the market—the only plug that actually **cleans itself!** Therefore the only plug that **can not short-circuit.**

Soot can not accumulate at the firing point because the heat of the porcelain "petticoat," which extends to the end of the plug, burns up carbon as fast as it settles.

In other plugs the "petticoat" extends only part of the way down, leaving a large space for the accumulation of soot.

The porcelain used in this plug is proof against rapid changes of temperature. Even when heated red hot and thrown into water it will not crack—a much severer test than would be encountered in actual service.

These plugs have been on the market over 12 years. Millions have been sold. Over 400,000 of America's finest cars are now equipped with them. Many have been in use for over 8 years and are still in service.

GUARANTEE

The J-M Plug is backed by a five-million dollar concern with a fifty-five-year record for square dealing. If any plug does not give satisfactory service we will supply a new one or refund purchase price.

Sold by most dealers. Shipped direct from our nearest branch if your dealer can't supply. Price $1.00. Write nearest branch for interesting illustrated booklet.

H. W. Johns-Manville Co.

Manufacturers of Asbestos and Magnesia Products — ASBESTOS (TRADE MARK) — Asbestos Roofings, Packings, Electrical Supplies, Etc.

Akron	Cincinnati	Houston	New Orleans	Salt Lake City
Albany	Cleveland	Indianapolis	New York	San Francisco
Atlanta	Columbus	Kansas City	Omaha	Seattle
Baltimore	Dallas	Los Angeles	Philadelphia	Syracuse
Birmingham	Denver	Louisville	Pittsburgh	Washington
Boston	Detroit	Memphis	Portland, Ore.	Wilkes-Barre
Buffalo	Duluth	Milwaukee	Rochester	Youngstown
Charlotte	Galveston	Minneapolis	St. Louis	
Chicago	Houghton	Newark, N. J.	St. Paul	2189

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED
Toronto, Montreal, Winnipeg, Vancouver

Millions in Use

A Special Spark Plug for Your Car

"Any old Plug" will not, cannot, give you satisfactory service. There is a particular model that is best suited to each car. And there is a particular **make** that is best suited to **all** cars. It is the

FORD TYPE

HERZ PLUG

"Bougie Mercedes"

We make special models for the Ford, the Pierce-Arrow, the White, the Pullman, the Amplex; extra long shanks for the Buick, the Overland, the Maxwell, the Pope-Hartford; and three standard models—½-inch, ⅞ x 18 (A. L. A. M.) and metric—which meet the requirements of all other motors.

HERZ PLUG has Double, Unbreakable Stone Insulation (Blue Enameled) and Four Sparking Points of Platinum-alloy. It is Self-cleaning and

Guaranteed a Full Year

HERZ & CO.
295 Lafayette St. New York
Makers of the HERZ MAGNETO

Have You An Unsatisfactory Magneto?

Even if your motor has no timer shaft you can nevertheless install

The Atwater Kent Ignition System

by means of our "Magneto Gear Mounting." It fits the standard magneto platform and connects to the magneto drive shaft. The gears it contains are enclosed, smooth running and quiet in operation.

For one-half the price of a new magneto you can replace your old one with an Atwater Kent System which will run your motor as smoothly "on high" at three miles an hour as at thirty or fifty. If you are also interested in increasing the speed, flexibility and hill-climbing ability of your car, you will want a copy of our latest literature describing the Atwater Kent System.

WRITE FOR FOLDER "A"

ATWATER KENT MFG. WORKS **4934 Stenton Ave. PHILADELPHIA**

TYPE 22 AMMETER

The Call for the Small

WITH the almost universal application of electric lighting to the gasoline pleasure car has come an imperative demand for smaller meters. This is but natural, as the dashboard space is limited, and the space requirements many.

Six years ago the Hoyt Electrical Instrument Works recognized the value of meters in promoting the efficiency of the gas car and designed their Type 25 Ammeters and Voltmeters for the purpose. This was the smallest practical switchboard meter on the market, and was but 3″ diameter over all.

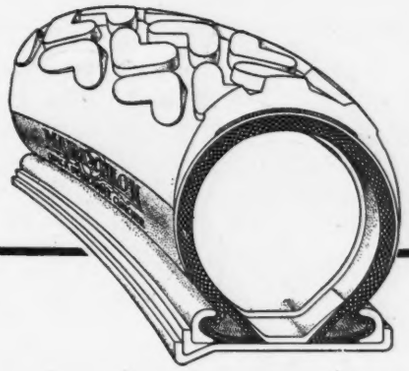
Thousands of them in constant use on pleasure cars the world over testify in the strongest possible manner of their value as an aid to efficiency.

Recognizing the popularity of Hoyt Type 25 meters, other electrical instrument manufacturers are now making 3″ meters, but even the 3″ meter has been found to be too large, and the call is heard on every side for something still smaller. The Hoyt Type 22 meter is the response. 2¼″ diameter, accurate, rugged, reliable.

Many 1914 cars will carry these meters as regular equipment.

Ask for Bulletin Number 7.

Hoyt Electrical Instrument Works
PENACOOK, N. H.



Utmost Quality

Proved by the Tire

Mr. Dealer, if your trade wants the best in tires, we want to tell you about Marathon.

We build in the **Utmost in Quality**. That's proved by the tire.

We factory-insure 4,000 miles service. And the tire's service to users, proves 4,000 to be the minimum. The average mileage is far above that figure.

Study these reasons:

Sea Island Fabric: We use nothing but Sea Island. That's the finest tire fabric obtainable. It's highest in tensile strength. It's the costliest fabric we can buy, but the cheapest for tire users—it gives utmost service.

Finest Rubber: We use only finest rubber in building Marathon. See the tire and you won't question that fact. We spare no expense to attain highest possible quality.

Hand Built by Experts: Marathon tires are hand built by expert tire men, very slowly. Hurrying is not permitted. This slow, exacting method costs us more—cuts our profit—but it insures **perfect construction.** It insures utmost service to users.

Concentrated Tread: Note how we heap up the tread rubber where the wear comes. That feature avoids waste. And it increases mileage.

Live Steam Single Cure: We single cure Marathon tires, in live steam. That gives unitized construction—makes all parts one. Tread and fabric separation are impossible. The live steam single cure also increases wear resistance.

Insured 4,000 Miles: The above are reasons how we factory-insure Marathon tires for 4,000 miles. And they are reasons why the average service is far above 4,000.

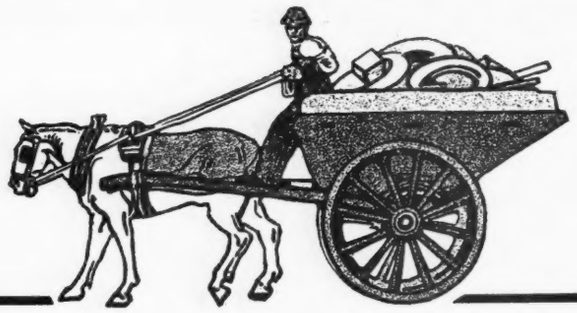
We absolutely guarantee every Marathon to give at least 4,000 miles. Motorists want this 4,000 mile tire. Do you see why you should sell Marathon?

Write for our Special Dealer's proposition.

The Marathon Tire & Rubber Co.
CUYAHOGA FALLS, OHIO

Distributors in most large cities

SPEED ENDURANCE MARATHON (108)



Don't throw away your old tires

Durable Treads are guaranteed 5,000 miles without puncture. By actual tests they have made tires run 12,000 miles without puncture or blowout, on the roughest roads in the world, in the Rocky Mountain district.

This is why over 20,000 American motorists use them,—why their sales have increased 917% in a single year.

Instead of throwing away your tires when they become worn and cut, cover them with Durable Treads—get 5,000 miles more service from them—save on tires your entire yearly cost of gasoline and oil.

They are a positive non-skid protection also. They will stop a car dead with the emergency brake, while going at high speed, on a wet asphalt street covered with wet leaves!

Durable Treads

See Them At Our Expense—Special Discount Offer

If Durable Treads are not represented in your locality, we will give you a special discount, equal to the full dealer's profit.

We will make treads specially to the measure of your tires, ship at our expense, give full privilege of examination, and you can ship them back at our expense—if they don't sell themselves to you! Not a penny expense to you; absolutely no risk or obligation.

Send for our book "10,000 Miles on One Set of Tires"—it tells the whole wonderful Durable Tread story—explains minutely their construction—tells what they have done for others. A copy of our 5,000-mile guarantee will also be sent. Tear out the coupon, before you turn the page and forget.

COLORADO TIRE & LEATHER CO.

1327 ACOMA STREET.....DENVER, COLO.
1111 KARPEN BLDG.....CHICAGO, ILL.
450 GOLDEN GATE AVE.....SAN FRANCISCO, CAL.

(Address nearest office)

Colorado Tire and Leather Company

Send me special discount terms, your book, "10,000 Miles on One Set of Tires," samples, and a copy of your 5,000-mile guarantee.

Name .....

Address .....

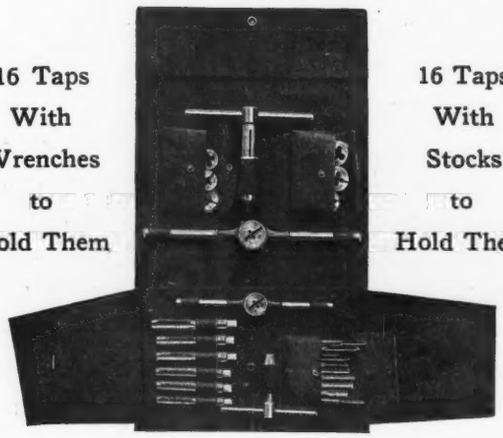
My Tire Sizes are.....

"Lightning" Repairs

Require a

"Lighting" Auto Repair Kit

16 Taps With Wrenches to Hold Them



16 Taps With Stocks to Hold Them

Genuine Leather

You are not fitted to run a **FORD CAR** till you have a "Lightning" Auto Repair Kit under the seat.

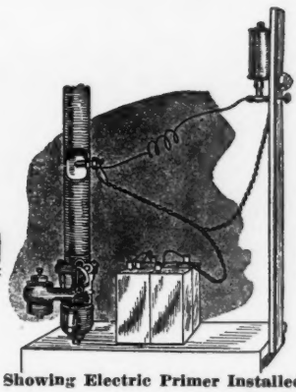
Cures sick, mutilated, stripped threads, and **makes** new threads where none were before.

Ask Your Dealer

If perchance he should not be "wise" write the manufacturers.

WILEY & RUSSELL MFG. CO.
Greenfield, Mass.

NEW YORK 90 Center St. | PHILADELPHIA 38 N. Sixth St. | CHICAGO 545 W. Washington Blvd.



Showing Electric Primer Installed

Let ELECTRICITY Solve Your Hard Starting Problems

Equip your car with a VOLCANO Electric Primer and forget that you ever churned a crank until your wrist was sore trying to start your car in cold weather.

You simply press a dash button and the VOLCANO enables you to start with a half turn of the crank. All hand spinning of the motor is eliminated, no matter how cold the motor may be.

Volcano ELECTRIC Primer

Spins Motor 200 Times On One Priming

Anyone can attach a VOLCANO Primer in 30 minutes.

By pressing the button on the dash there is sent into the mixing chamber of the carbureter a volume of vaporized gasoline sufficient to spin the motor 200 times—giving it a chance to run on its own gas.

The gasoline retainer behind the dash contains sufficient gasoline for 150 primings. The gasoline from this container flows through a pipe to a cup-like device which is screwed into the carbureter mixing chamber. This cup holds about a thimbleful of fuel.

Over this cup is a plate to which the fuel is fed by a wick. When the cup is filled with fuel and the batteries turned on, by the pressure of the dash button, the heat generated by the battery current passing through the plate, causes the gasoline to vaporize immediately. It takes three seconds to generate one priming.

The VOLCANO primer is admirably adapted to cars equipped with self-starters. The VOLCANO relieves the little starter motor of 50% of the strain on it, increasing its life and efficiency accordingly.

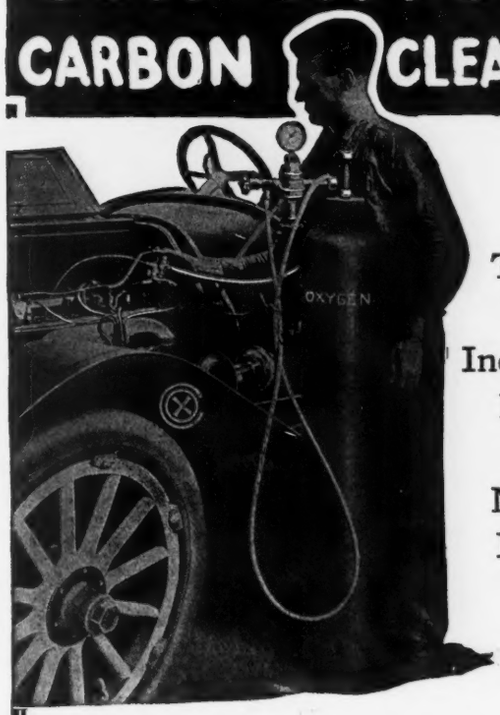
Price $10.00

SENT PREFAID ON RECEIPT OF PRICE

DEALERS: Write for agents' proposition in unallotted territory. Get in touch with us today

Volcano Electric Primer Works
Virginia, Illinois

COX OXYGEN CARBON CLEANER



New
Thorough
Quick
Inexpensive
Harmless
Efficient
Necessary
Profitable

The first really efficient and thorough method of cleaning carbon out of the cylinders is the new Cox Oxygen Carbon Cleaner. It consumes every particle of carbon, even in corners where it could never be scraped out, without the slightest possibility of harming the cylinders.

It takes from 6 to 10 minutes to clean each cylinder, averaging 30 minutes for a four cylinder motor and 45 minutes for a six. Any workman can do it. Does not require experience or expertness. Absolutely safe to handle.

For Public Garages

The profit possibilities for you in the Cox Oxygen Carbon Cleaner are only limited by the number of your customers. You do the work in one-tenth the time and only a fraction of the cost of any other method. Motorists will pay you well to clean their cars regularly. It is just as necessary as washing the car. This new method will quickly establish the custom of regularly cleaning.

For Large Private Garages

For private garages in which more than one or two cars are kept, the Cox Oxygen Cleaner is a good investment. It pays for itself in the greater economy and improved running of the car.

Write Us Today

and we will prove that your profit per cylinder is almost gross—that you can actually pay for the carbon remover several times over inside of a week—this has been done.

Get the information—read the detailed facts—learn still more about the integrity and responsibility back of the house that guarantees every claim made for this—the only **real** carbon cleaner.

COX BRASS MFG. CO.
ALBANY, N.Y.

1779 Broadway
New York City

870 Woodward Ave
Detroit, Mich

COX BRASS MFG. CO., Albany, N. Y.

Gentlemen: Please send me full information about the Cox Oxygen Carbon Cleaner.

Name.....

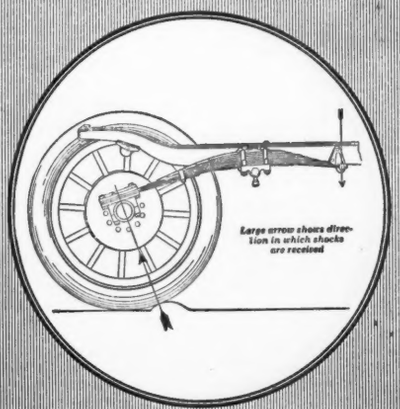
Address.....

City.....

State.....

M. A. 10-23

"NONE SO EASY RIDING" —and the Reason



KING

A KING Owner Is Our Best Sales-Agent

Every time he drives his car or compares it with others of near price he is convinced anew, and convinces his friends, of the KING'S high value for

$1095 WITH EQUIPMENT

Famous Ward Leonard Starter and Generator $100 net additional

Rough Roads Smoothed Out

by the KING'S FLOATING CANTILEVER SPRINGS which are a modification of those used with such notable success by the Lanchester Motor Car Company of England. They are set at right angles to the direction taken by the resistance offered to road shocks. The arrows in the illustration show how this adjustment receives and throws back all jars. These springs make auxiliary shock-absorbing devices wholly unnecessary, give ample road clearance and freedom from "side swing," guarantee complete comfort to occupants, and assure a long, economical life to car and tires.

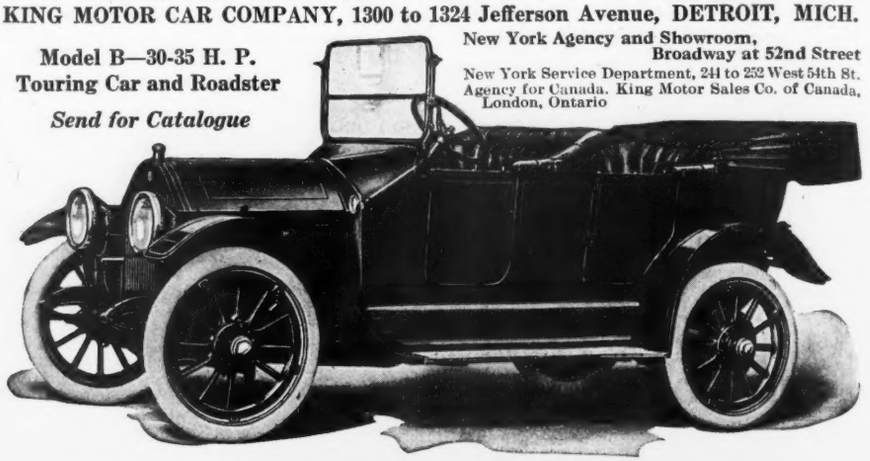
KING MOTOR CAR COMPANY, 1300 to 1324 Jefferson Avenue, DETROIT, MICH.

Model B—30-35 H. P.
Touring Car and Roadster

Send for Catalogue

New York Agency and Showroom, Broadway at 52nd Street

New York Service Department, 241 to 252 West 54th St.
Agency for Canada. King Motor Sales Co. of Canada, London, Ontario



WARNER GEAR CO.

The reputation of this concern has been attained by its successful endeavor to build dependable and efficient gear assemblies, embodying in each ensuing design the mechanical features which have characterized their product in the past years and incorporating in their new designs any new constructions which are noteworthy and of mechanical value, and which will, in any way, add to the merits and efficiency of the products of the Warner Gear Company.

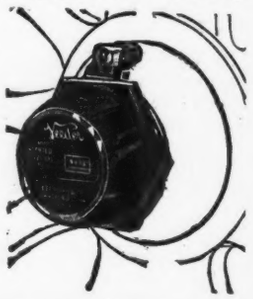
In other words, the past experience of this company and the present methods which they employ absolutely assure the purchaser of Warner assemblies that he is buying that individual unit which will be one of the most valuable assets to his Salesman's argument.

MUNCIE-IND

Veeder

Exactitude

in the mileage of an automobile or motor truck is a primal necessity if you insist upon knowing the upkeep cost of tires, gasoline or "juice" and lubricating consumption. A VEEDER HUB ODOMETER is not only exact but CAN'T BE TAMPERED WITH.



Neat, durable and compact, it can be easily attached. Price complete, **$25.00**

At your dealer's, direct from our factory, or at the following agencies:

T. H. Cranston & Co., 56 E. Randolph Street, Chicago, Ill.

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The Veeder Manufacturing Company

C. H. VEEDER, President **D. J. POST, Treasurer**
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HARTFORD, CONN.

Makers of Cyclometers, Odometers, Tachometers, Tachodometers, Counters and Small Die Castings

U-S-L U-S-L

Takes the place of the Fly=wheel

The U-S-L Electric Starter and Lighter is a combination motor and generator that takes the place of the fly-wheel. The armature of the motor-generator is bolted directly to the engine crank-shaft.

The U-S-L doesn't add a single extra moving part to a car.

No gears or chains — **No extra clutches**
No added weight — **Starts at a push of foot-button**
No bearings to oil — **Supplies ample current**

Adopted by
Rambler, Garford, Edwards-Knight, Moyer, S. G. V.

Write for Bulletin 501

The U. S. Light & Heating Co.
General Offices: 30 Church St., New York

Branch Offices and Service Stations—New York, Boston, Buffalo, Cleveland, Detroit, Chicago, St. Louis, San Francisco.

Motor Common Sense!!

Merely igniting the mixture and smooth engine running means only absence of spark plug trouble. It does not signify full firing efficiency.

Explode completely the least necessary amount of fuel and you are bound to increase the engine efficiency—increase the power, reduce consumption, or do both.

McCORMICK POWER PLUG

Embodies a unique process of firing and gives highest possible explosion energy.

Let us prove this

Price $2 each net, prepaid.

Sent on 20 days' approval.

McCORMICK MANUFACTURING COMPANY
442 East First Street — **DAYTON, OHIO**
Exclusive territory to agents who will meet our requirements.

MAYO SPARK PLUG PUMP

$10 Substitute for any spark-plug. The motor does the work, fills the largest tire with pure, fresh air in from 2 to 3 minutes. Built with metal rings like a motor and will last as long. Adaptable to all size cars from the smallest Ford to the largest Lozier. Weight, 2½ lbs. Complete with 12 ft. of hose and connections. Price, $10.00. With pressure gauge, $2.00 extra.

Mayo Mfg. Co.
55 East 18th Street
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Try It FREE on Your Car For 30 Days

Write Us

Starts — Lights — Ignites
REMY
Six Volt System-Does-It-All

WE are the only factory able to assume complete responsibility for the ***entire*** efficient electrical equipment of your product. Remy apparatus is furnished as a whole — or in any combination. The Starting and Lighting equipment is furnished to manufacturers only.

Risk of obsolete equipment is eliminated; service demands of the individual owners are centered in one factory.

Because the Remy is a fourteen year old concern with a national service organization, you are guaranteed ***permanent efficiency.***

Liberal magneto (any make) exchange offer.

Remy Electric Company
General Offices and Works, Anderson, Indiana

BRANCHES:
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(Service stations throughout the country)

Something New:—

The "NYCO" Accelerator and Power Adder for Ford Cars

Proves a revelation on any Model "T" Ford car and will give a **great increase in speed, a marked saving in gasolene,** and a **perfectly cool motor at all times.** Prevents the formation of carbon in the cylinders and spark plugs, and gives to the **Ford a smoothness and quick acceleration hitherto unknown.**

Installed between the carburetor and inlet manifold without drilling or tapping in fifteen minutes.

Price Complete

$5.00

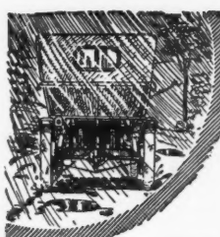
Liberal Discount to the Trade

SHEER MERIT has proven our new Model "T" and **Senior MASTER VIBRATORS** SUPERIOR TO ANY EXISTING TYPE.

"Senior" Model.....$12
The New 1914 Model "T"..$10

DISCOUNTS ARE RIGHT AND THEY "STAY SOLD"

NEW YORK COIL CO., 339 Pearl St., New York, N. Y.
Western Branch—1429 Michigan Avenue, Chicago, Ill.



Neither Rain, Mud Nor Dust Can Harm

your luggage when it is carried in the new rain-proof, water-proof

Kamlee Auto Trunk

"Made by Trunk Makers Who Are Motorists"

Embodies every desirable feature—strength, lightness, durability, beauty. It adds to rather than detracts from the appearance of any car.

Consider these exclusive Kamlee features before you buy an auto trunk, then you'll surely select a Kamlee: patent drop front—no lifting of lid—patent inter-locking edge makes it air-tight, dust-proof, rain-proof; no straps to bother with in opening; fitted with standard suit-cases permitting removal of one party's luggage without disturbing others.

Ask Your Dealer or write us for price and descriptive circular. If your dealer can't supply you, **we'll gladly ship you a Kamlee on approval.**

THE KAMLEE CO.
234 Broadway, Milwaukee, Wis.

Look for the Red and Gold Diamond Inlaid Right on Front Cover

Loosens the carbon in the cylinder, and it is blown out the exhaust.

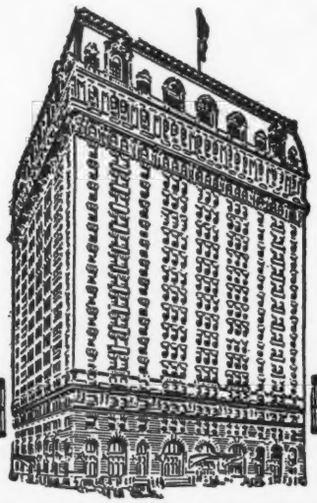
Carbonox is the simplest, most satisfactory carbon remover yet produced.

"Chemically Correct"

We also make SE-MENT-OL the self acting radiator cement. "Finds the leak and fixes it in fifteen minutes."

THE NORTHWESTERN CHEMICAL CO.
Marietta, Ohio.

CARBONOX
CHEMICALLY CORRECT CARBON REMOVER



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CHICAGO'S FINEST HOTEL

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Located in the heart of the city, within easy reach of all railway terminals

RATES

ONE PERSON	Room with detached bath.....	$2 to $3 per day
	Room with private bath.....	$3 to $5 per day
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	Room with private bath.....	$5 to $8 per day

TWO CONNECTING ROOMS WITH BATH

Two persons	$5 to $ 8 per day
Four persons	$8 to $15 per day
SUITES	$10 to $35 per day

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Patented

Basline
Autowline

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**WEIGHS FIVE POUNDS
PULLS 4000-POUND CAR
UP A 20% GRADE**

Tuck a Basline Autowline under an auto cushion and be prepared. Takes up no room; is clean, neat, compact. Made out of World Famous Yellow Strand wire rope—the record rope on the Panama Canal—built the Woolworth Building, and is used by all big contractors. You can attach

BASLINE AUTOWLINE

for use in a minute and get out of any road difficulty in a jiffy. Read this user's evidence:

Near Princeton, N. J., I saw three automobiles in trouble. One, a seven-passenger car, was up to its hubs in a ditch. The other two were lighter cars. With my Basline Autowline I pulled all three out without any trouble. All were enthusiastic about your Autowline. No touring car should be without one, as you supply it in such a compact manner.
J. NOAH H. SLEE, New York.

FREE Send today for the fully illustrated Autowline Circular. It's free. Basline Autowline is sold by every good Supply Dealer for $3.75.

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NEW YORK OFFICE, 75 E. Warren St.
Sole manufacturers of world-famous Yellow Strand Wire Rope

"NOARK" FUSES

For the Protection of Automobile Lighting Systems

"Noark" Fuses offer protection to the various circuits of an automobile lighting system. They protect the lamps, wiring, storage battery, etc., from damage due to excess currents.

"Noark" Automobile Fuses are made with the same care and accuracy as are the larger capacities, recognized for years as the acme of perfection by Street Railway and Central Station Lighting Companies throughout the country.

As "Noark" Fuses always operate without arc or flash, they are especially desirable for the protection of Automobile Lighting Circuits where the emission of flame might possibly ignite gasoline vapors.

With "Noark" Automobile Fuses each lamp or circuit can be individually protected, as "Noark" Fuse Blocks or insulated bases are furnished for one, two, three or more fuses as conditions require.

Write nearest Branch for booklet.

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Albany	Cincinnati	Kansas City	New Orleans	San Francisco
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THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED,
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Simple, Efficient and Economical

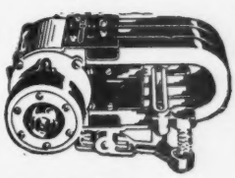
The
K-W Electric Headlight Outfit, $40
Complete Outfit: Generator, Head Lamps, Switch, Wire and Bulbs

Easy to Install. Mount in Any Position

Runs in Either Direction

Has Only One Moving Part

No Commutator or Brushes

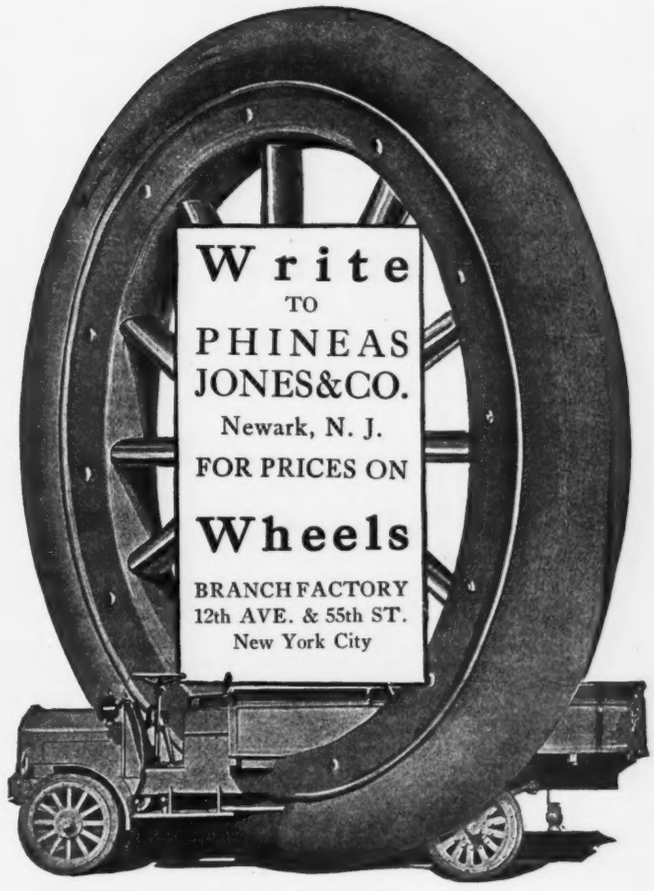


Gives 2.1600 C. P. Headlights

Send for Descriptive Folder. We Also Make a

K-W Ford Electric Headlight Outfit, $15
FOR FORD CARS WITH FLYWHEEL MAGNETO
and the famous K-W Master Vibrator
The Standard by Which All Others Are Judged

THE K-W IGNITION Co
2835 Chester Avenue CLEVELAND, OHIO. U.S.A.



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TRADE MARK REGISTERED IN UNITED STATES PATENT OFFICE

NON-FLUID OIL

Costs more than other lubricants for bearings and gears but its use reveals true Economy in dollars saved on repairs and in Efficiency retained in your car.

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GOODYEAR
AKRON, OHIO

This name on Automobile Tires and Rubber Accessories signifies inherent qualities of material and workmanship that insure the maximum of service at the minimum of expense. (678)

THE GOODYEAR TIRE & RUBBER CO.
AKRON, OHIO

"Imperial Twelve"
Garage Compressors

A high-class car equipment deserves high-class garage equipment. The quality of these little compressors is such as to appeal to the most discriminating buyers.

Booklet 608

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"THE TUGBOAT OF LAND COMMERCE"

SOLVES THE HEAVY TRUCKING PROBLEM

Knox

MARTIN TRACTOR

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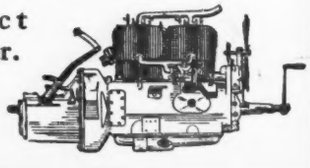
KNOX AUTO CO., SPRINGFIELD, MASS.

Ergon Motors are "work" motors. Their Simplicity of design assures long life and ample power.

We never over contract our ability to deliver.

Three models. Model C, 3 3/4 x 4 1/2; model CX, 4 x 4 1/2; model D, 4 3/8 x 6.



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Dixon's Graphite
Transmission Grease
No. 677

For Transmissions and Differentials

Lengthens the life and increases the mileage of any car.

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Made in JERSEY CITY, N. J., by the

JOSEPH DIXON CRUCIBLE CO.

UNIVERSAL JOINTS
"SPICER" MEANS QUALITY

"SPICER" on universal joints means quality, and "SPICER" quality has been a standard ever since universal joints have been manufactured.

Let us quote you prices on your requirements

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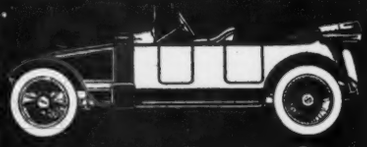
KEETON
DETROIT, U.S.A.

"SIX-48" $3250 Fully Equipped



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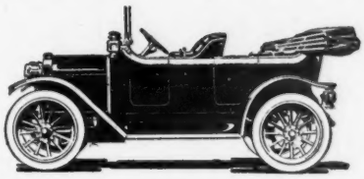
Riverside Touring Car

Keeton Motors Ltd. Brantford Ont. Canada.

Keeton Motor Co. Lawton & M.C.R.R. PHONE WAL 1067 Detroit U.S.A.

The Detroiter — $850 FULLY EQUIPPED

Five Passenger Touring Car



25 H. P. Long Stroke Motor

Enclosed Valves, Three Point Suspension, Unit Power Plant, Platform Rear Springs, Full Floating Rear Axle, Left Hand Drive, Center Control, Drop Frame, Large Tires, Complete Ball Bearing Car

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"Always There"

The SPLITDORF "TS" TRANSFORMER is interchangeable with any type tube or dash coil and can be attached to any car. We will make a very liberal allowance on an old coil in exchange for one of the new style.

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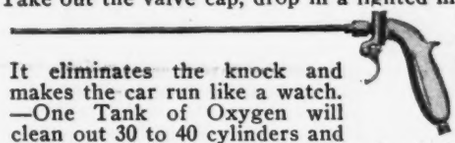
The Oxy-Carbon Removing Outfit

Big Profits to Garages

Use the scientific method of removing carbon from engine cylinders. Most thorough, cheapest, quickest, safest, cleanest and most satisfying to your customer. You cannot afford to be without it.

Done in three minutes per cylinder. Costs fifteen cents per cylinder. Carbon converted into carbonic gas. No flakes to get under valves.

Something entirely new—200 in use in Boston already. Take out the valve cap, drop in a lighted match and pull the trigger. One look will convince.



It eliminates the knock and makes the car run like a watch. —One Tank of Oxygen will clean out 30 to 40 cylinders and this gas can be procured of any local Oxy-Acetylene Welding Shop or of the Manufacturers having Charging Stations at convenient points in various sections of the country.

Price to Garages, $25.00

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The New Jones Speedometer Unaffected by Heat or Cold

You want absolute accuracy in speed readings just as you want the right time from your watch. There is one way to get it—get a New Jones.

Any motor car maker will equip with it if you state plainly you want nothing else, no matter what speedometer he may list in his catalog as equipment.

Write us for facts, tests and experiments that show Jones supremacy beyond question. Then specify what speedometer you want on your car this spring.

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MANUFACTURED SINCE 1901 FOR HIGH GRADE

AUTOMOBILES AND TRUCKS

3¾ x 5¼ four and six cyl.
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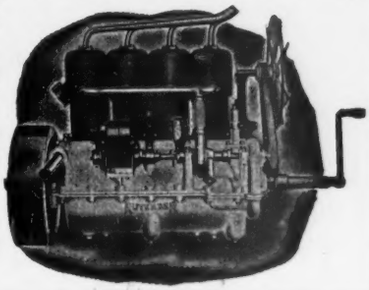
Standard or Unit and
4 x 4, 4½ x 5 and 4¾ x 5 Standard Types. All L Head 4 Cycle.

Manufacturers are invited to investigate our service and our facilities. Literature on request.



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should possess a reliable, durable, convenient Electrical Measuring Instrument

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Portable Testing Instrument

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and are in every way the most accurate, durable, reliable and altogether satisfactory for testing batteries and electrical circuits.

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Use POLO Pneumatic Rim Cutting Entirely Done Away With

Bored from solid brass

Tire Alarm

Heavily Nickeled

Thoroughly Tested and Guaranteed

Easily and quickly attached to valve stem, they take the place of the cap. Compactly made and reduced to the smallest possible size compatible with strength and durability.

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Running on low air pressure shortens the life of a tire more than any other cause. The Polo Pneumatic Alarm advises you instantly when the pressure falls below a given point, by giving vent to a shrill whistle. We invite inquiries from dealers and auto users.

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All the Facts on
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mailed you on request

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Easiest and quickest operated top ever manufactured. Fully protected by patents. Right prices to manufacturers.
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4" x5"	6 cyl.	3 Enbloc
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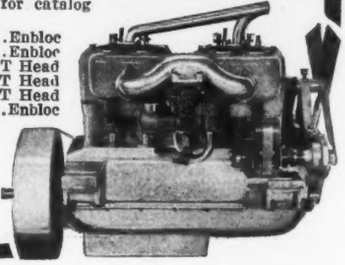
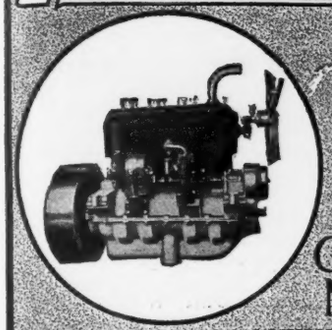


Wisconsin Motor Mfg. Co.
Dept. 25 Milwaukee, Wis.

Continental Motors



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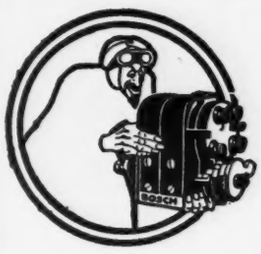

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THE Bosch-Ford Attachment makes it possible to easily install the Bosch Magneto on the Ford car—it gives greater efficiency in every respect and the same reliable ignition supplied with Packards, Pierce-Arrows, Locomobiles, etc.

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Utilize all the power you pay for by equipping your motor with

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Unexploded gases mean lost power, wasted gasoline and smutted cylinders. SUPERIOR Double Ignition SPARK PLUGS act in connection with the plugs you already have, producing two simultaneous opposed sparks, insuring ignition of all the gases in the cylinder—developing all the power of which your motor is capable.

DEALERS: This is proving a big money-maker everywhere—write for full information and our exclusive territory proposition.

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27 h. p. Motor 3⅜"x5", Unit Power Plant, 3 point suspension. 105" wheelbase. 32x3½ tires all around. 3 speed selective sliding gear-transmission. 5 pinion bevel gear differential. Left side drive. Center control. Speed, 55 miles per hour. Will climb any hill where wheels will hold. Also build 5 pass. touring car 115" wheel base, completely equipped, $850.

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$750

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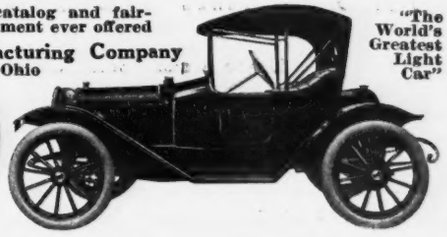

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Write for photographs, descriptive literature and the exceptional values we offer you—far beyond all others.

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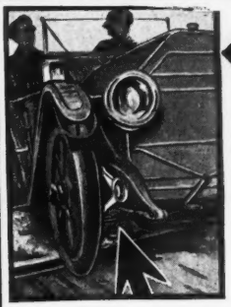

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Shock Preventer

A scientific, mechanical triumph. NOT FRICTION, but graduated resistance of *rubber* discs according to road conditions. Made in sizes to fit any car.

They are being rapidly adopted by car builders as standard equipment and by car buyers everywhere. *Ask us to prove this.*

If you are interested in eliminating bouncing and saving tire and repair bills, write today for Booklet "N"

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The *Pilot* "THE CAR AHEAD"

Three Great Models— Pilot 50—4 cylinder, 4½x6—59 H.P. —120 inch wheelbase, roadster and touring car—$2250. Pilot 50—roadster—4, 6, and 7 passenger bodies, 126 inch wheel base—$2500. Pilot 60—6 cylinder, 4x6, brake test 67 H.P., 132 inch wheelbase, roadster, 4, 6, and 7 passenger touring cars —$2785.

THE CAR WITHOUT A MECHANICAL DEFECT

Teetor "T" Head Motors, full floating rear axles, Brown-Lipe differential, Warner transmission, Eisemann Magneto. Carter Carbureter, handsome jewel bodies with ventilating windshield. Completely equipped with every convenience and comfort. Dynamo electric lighting and electric starter (Gray & Davis system), power tire pump. We have the greatest agency proposition in the United States. Write for our beautiful art book showing cars in detail.

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1914 *Marion* 1914

SEND to us today for advance folders which tell all about the big, new six-cylinder MARION. See the advertisements in all trade papers; wire us about our unusual dealers' contract for 1914.

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More power - Less fuel - Wider range

FINDEISEN & KROPF MFG. CO.
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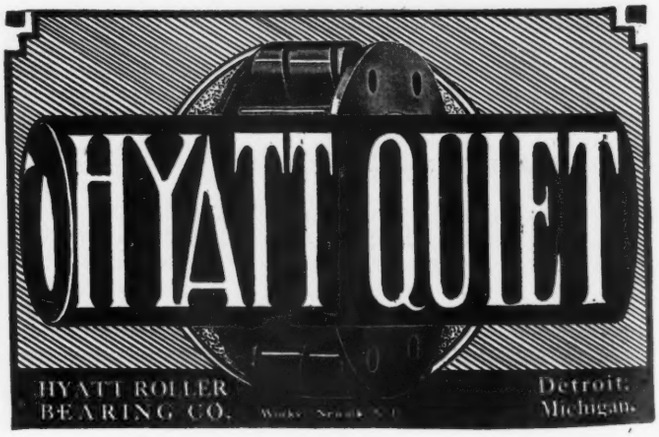

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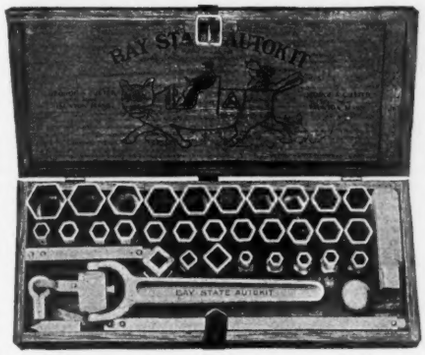

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31 and 12 sockets respectively, made of the best steel.

Ask your dealer or write us.

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till you see our announcement, it will appear soon.

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Made to last for years. The double insulation, impregnated with flexible enamels, positively resists heat, oil, water and dirt.

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Contains 48 pages of real information about electrical installations on automobiles and Motor Boats. 25c postpaid.

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$60.00 A Year Saved In Tires

That's only one of the savings now offered motorists by the already well known

TAYLOR "NOIL" TIRE PUMP

An engine driven tire pump that adds to life of tires by keeping rubber-rotting oil and oily vapor out of the tube. No oil to **get** in. Also saves an endless amount of **back-breaking** pumping by HAND! Engine does it **all.** That's the other advantage. The **only** pump made with diaphragm and plunger. The **one** pump that CAN be **easily applied!** Special bracket for your own car furnished together with hose, tire gauge, etc.

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In writing, please give make, model and year of your car.

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Six Cylinder, 65 H. P.
Equipped with Vulcan Electric Gear Shift.

Four Cylinder, 40 H. P.
Equipped with Vulcan Electric Gear Shift.

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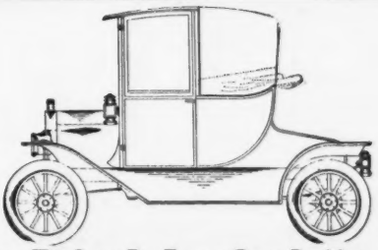
Our advertising campaign will send a buyer into your showroom more than half convinced that he should own a Haynes; the sale, however, results only from a successful demonstration; it is our firm belief that as a Haynes dealer you possess more than a sufficient number of convincing arguments to make every demonstration result in a quick and profitable sale.

May we tell you why we believe this?

THE HAYNES AUTOMOBILE CO., 2 Main St., Kokomo, Ind.



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Light, durable, well designed, comfortable, with folding top. A practical body for all seasons.

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Four & Six Cylinders
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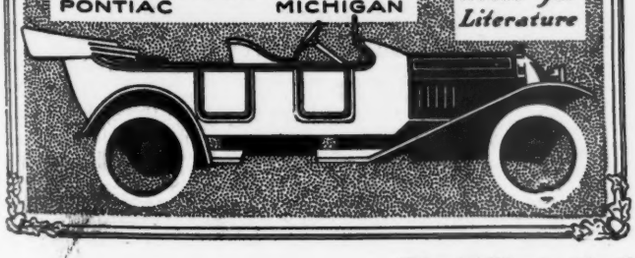

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Electric Lighting — APLCO — Electric Starting

The Aplco System

Your motoring is made a pleasure; night riding is no longer a nerve strain; it's delightful, safe.

The Aplco Electric Starter never fails to turn your engine; it is a starter that never stops starting.

You'll want to know more about the Aplco Electric Lighting and Starting System. Ask us for full particulars. Then demand it on your new car.

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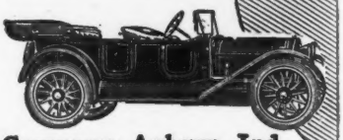
The 6-Cylinder, Reasonably Priced

deSotoSix 55 H.P.

The car with a stronger appeal than any recent product of the trade—the one that meets a popular demand. We have an unusually attractive proposition for dealers. Write at once for free catalog and full particulars.



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You Need This Book

No car buyer wants to buy a loser. Avoid it by getting the facts. Our booklet on present conditions in the automobile industry will help you to know something about the situation. Ask for Book No. 41; it includes car description.

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A discriminating public has voted in favor of Solars—the quality motor lamps.

Backed by 15 years of specialization. Found on more high-grade cars than all other makes of lamps.

A Solar Lamp for every motor need.

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They are strictly high-grade—built to outlast all others—and they do it. Ask any user.

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Gearless! Not even a clutch! The simplest car made—unlimited speeds—one lever control—climbs steep hills. Twice the usual tire mileage. Send for catalog—Cartercar Company, Pontiac, Michigan

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The LAMBERT Model 99 (5-passenger touring car or 2-passenger roadster) at $1365 (fully equipped) stands at the head of its price class. It comprises 4⅛x5¼ Rutenber motor, 117" wheelbase, famous LAMBERT friction drive, one lever control, etc. Write for catalog.

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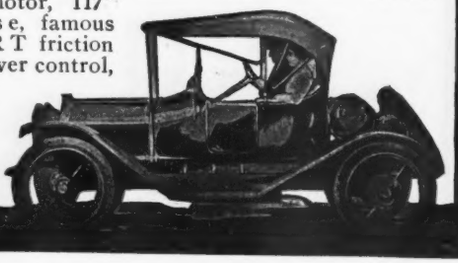

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KEATON NON-SKID TREAD

has four times the wearing service of the ordinary non-skid. Users will tell you that they have run Swinehart Keaton Non-Skid Tread Tires a whole season without having them lose their anti-skid effectiveness. Call at any one of our stores and investigate them. We also make a complete line of Smooth Pneumatic Tires of best quality. Branches and distributing agencies in all leading cities.

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AUTOMOBILE LAMPS

The lights with the great white ray that turn night into day

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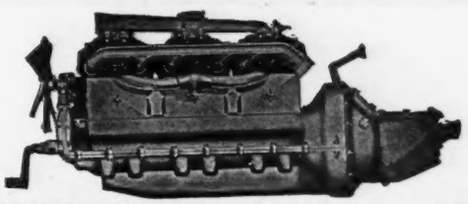

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Beaver "Sixes" offer the following 1914 features; long stroke (3¾ x 5); just right power, 45 H. P.; 3-point suspension; large valves with enclosed action; enclosed fly wheel; 3-speed transmission; noiseless, vibrationless, oil and dust tight action; arrangement for installation of any make Electric Starting and Lighting System. Write for catalog and prices.

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Builders of 2, 4 and 6 Cylinder Motors
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SCHAFER BALL BEARINGS

MADE IN GERMANY SOLD IN AMERICA

When you buy SCHAFER BALL BEARINGS you are not experimenting because SCHAFER BALL BEARINGS have for years been recognized as the standard of bearing quality. They are made in Germany of the best steel, and are now in universal use throughout the world.

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Model "36" $1275.00

A car whose design and construction is so far ahead of others at its price that it is in a class all its own.

Gray and Davis Electric starting and lighting equipment, silent chain cam shaft drive, four inch by five inch motor, cork insert multiple disc clutch, 116 inch wheel base, left side drive, center control, and equipment complete to the last detail.

Model "25" $975.00
Including Electric Starting and Lighting System

This model has made the Paige reputation. Such a sturdy, powerful, comfortable car has never been offered the public at anywhere near its price. $975.00 with complete equipment.

Splendid Agency Proposition

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Everything In Sheet Metal for the Automobile

We manufacture only one unit of the automobile—the sheet metal parts. They are twenty in number—but the same nature underlies them all. Hayes sheet metal parts are built into nearly every automobile made. We're the largest users of sheet metal in the world. We do only one thing—and do it well. That's the reason.

Hayes Manufacturing Co.
DETROIT, U. S. A.

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THE UNIVERSAL CAR

After the harvest the wise man buys a Ford. He provides himself both pleasure and an efficient and economical servant for the seasons to come. Viewed from any angle, he knows the Ford is his best "buy" of the year.

Five hundred dollars is the new price of the Ford runabout; the touring car is five fifty; the town car seven fifty—all f. o. b. Detroit, complete with equipment. Get catalog and particulars from Ford Motor Co., Detroit.

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BEST IN THE LONG RUN

There is nothing in Goodrich advertising that isn't in Goodrich goods.

The B. F. Goodrich Company
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Everything That's Best In Rubber
BRANCHES IN ALL PRINCIPAL CITIES

WHY KEEP A CAR STANDING IDLE IN A GARAGE WITH A BROKEN SPRING

When a **Kantalever Emergency Spring Repairer** will mend the break in five minutes and carry the usual weight of the spring as if it were a new spring.

Price $3.50 *Patented*

Every motorist should carry a KANTALEVER EMERGENCY SPRING REPAIRER and every motorist will anchor his faith in a KANTALEVER EMERGENCY SPRING REPAIRER when he awakens to the necessity of providing against the emergency of broken springs.

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The Standardized Car

The car that started the stampede to standardization

A Cole franchise is a valuable asset to any dealer. Find out about it.

Cole Motor Car Co. of Indianapolis

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A New Six—For a New Market

Every feature is standard and the highest of its class, both in quality and reputation.

Five-passenger touring car completely equipped —$2485. *Dealers write for open territory*

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Transmissions
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Five Models, $2750 to $3400

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Our new addition is ready for occupancy. We now have 360 rooms with 265 baths. Write us for descriptive folder with typical floor plan and rate card. Wire for reservation at our expense.

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MANAGER
Also The Berwick, Rutland, Vt.

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The Only Genuine Streamline Motor Car Built In This Country

This epoch making automobile with VULCAN ELECTRIC GEAR SHIFT & WIRE WHEELS priced at only $2400.

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Final and crowning achievement of R. E. Olds, pioneer designer of autos. A standard size 30 to 35 horsepower four-cylinder car of modern refinements priced at only $1175.

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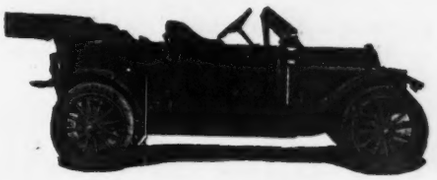

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Made by Bridgeport Brass Co.

Increases the Life of Tires

The STAPLEY makes it easy to keep tires properly inflated.

It is an efficient Compound pump of the finest materials and workmanship; it is always ready and always works.

Price without Gauge $4.00 — With Gauge $6.00

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In this new process, the steel is worked both longitudinally and transversely. So we get superior strength and toughness. We use this process exclusively in our Chrome-Vanadium Brand of Springs.

Find out more about them. It will make a tremendous difference in the riding qualities of your car.

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Best Grade—Chrome-Vanadium
Next Best—Special Analysis

Let us send you full particulars

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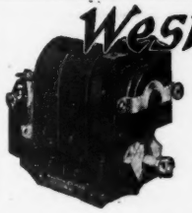

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New York and All Principal Cities

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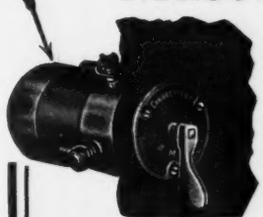
Master Vibrator For Ford Cars



A dependable master vibrator at a reasonable price. Makes starting easy—motoring becomes a pleasure.

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¶ HESS Axles have been on the market but 2 years. Fourteen car manufacturers in that short time exclusively adopted them as regular equipment.

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THE THOROUGHBRED CAR

Electric Self-cranking, Electrically Lighted
Four Forward Speeds

"Six Thirty-six" Touring Car and Roadster, $1850
Model 30 Touring Car..$1350 Model 30 Roadster..$1250

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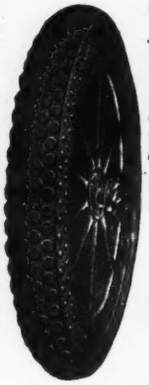

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$1490!

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Left Drive
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Wide Doors (with concealed hinges) as on 1914 European Cars
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REXO—Single-tone Electric Horn—$8. Guaranteed for life—Instantly responsive—Eliminates constant care and adjustment.

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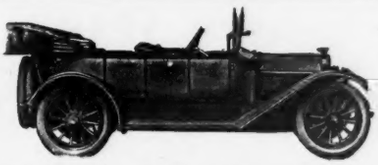

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The car which most perfectly meets the medium weight demand. Dealers should carefully consider this fact.

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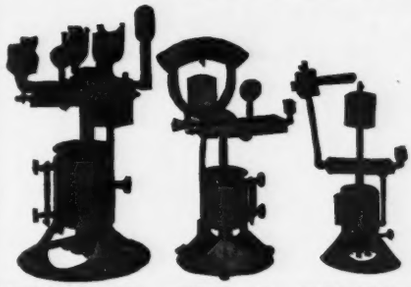
THE PROFIT MAKING PLANTS



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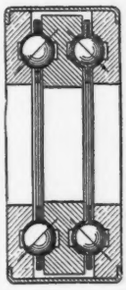

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The arrows on the cross section show how the load is evenly carried by upper as well as lower balls, making the only perfectly balanced radial bearing, and at the same time an ideal thrust bearing. This Double Row Ball Bearing will carry a greater load than any other ball bearing.

Races made from solid, special analysis steel. Specially selected alloy steel balls. Maximum size and greatest number of balls. Greatest bearing surface between race and balls. Closest limits of guaranteed accuracy.

Now used in motor cars, machinery, and to equip our Special Shaft Hangers. We also make plain and grooved thrust bearings.

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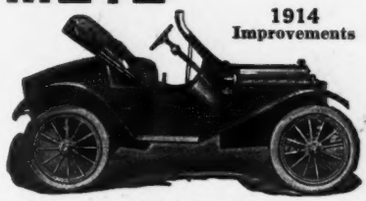
THE GEARLESS CAR

"No clutch to slip — no gears to strip."

1914 Improvements



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Completely Equipped

Center control, left-hand drive, 4-cylinder 22½ H. P. water cooled motor, Bosch magneto, standard artillery wheels, best quality clincher tires, extension top, windshield, five lamps, gas generator, tools, etc. Makes 5 to 50 miles per hour on the high speed, 28 to 32 miles on 1 gal. of gasoline, climbs hills as fast as ANY stock car made. A strong, reliable, stylish, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory. Write at once for Book "K" and particulars.

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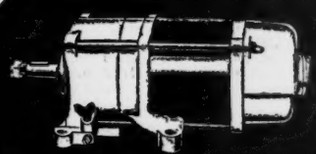
ELECTRIC STARTING & LIGHTING

ASSURES 100% EFFICIENCY



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Fan from your 1914 specifications. Our One-Piece blade, ball-bearing, radiator fan assemblies cool the motors of more high-class cars than any other fan on the market. There's a reason. SPARKS-WITHINGTON Fans deliver the greatest volume of air with the least H. P. consumption of any fan obtainable. Furthermore, their one-piece construction is positive insurance against blades which loosen, become detached and fly off. Undoubtedly one of our ten standard models is just what you have been looking for. Catalogue and detailed blue-prints on request. Get in touch with us.

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SILENT—SELF-LUBRICATING

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The only medium priced six that is not a new untried model
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Each section 2 in. wide. The hook to rims. Try two or three sections over any old blowout.
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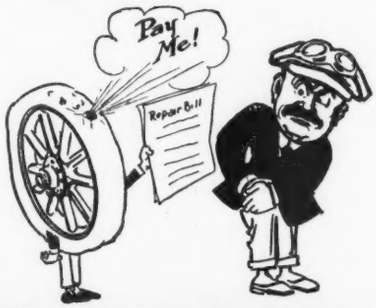
Own the Vulcanizer you're paying for.

Yes, paying for it in repair bills and tire service that you don't get. You buy two tires where one would do as well.



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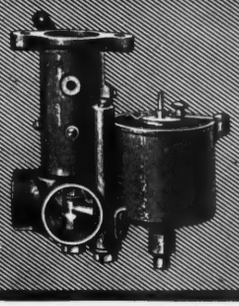
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Infallible Starting
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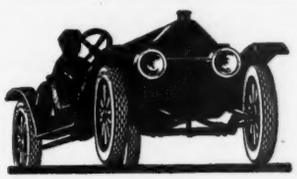

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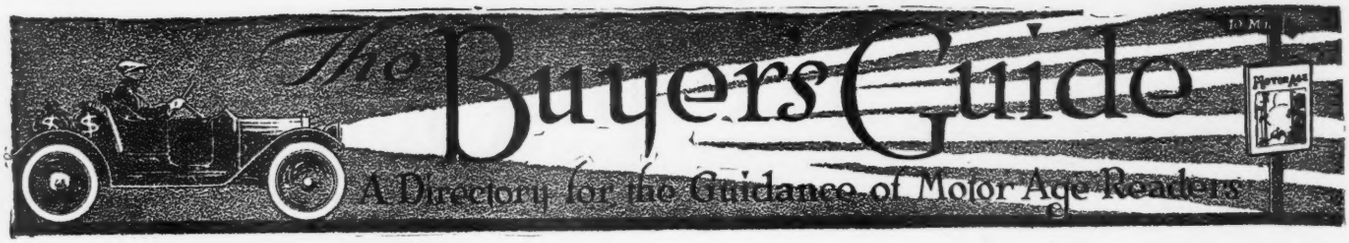

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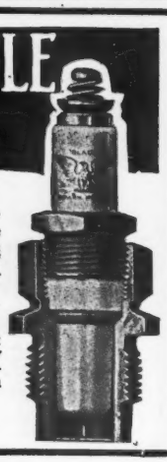

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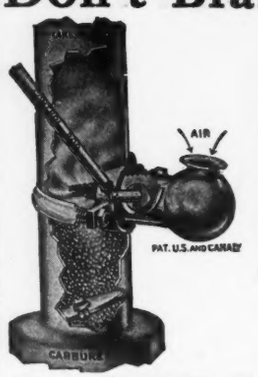

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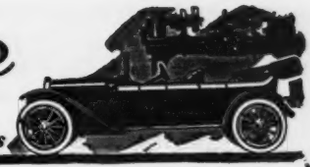
For Second-hand Shop Equipment - Used Cars - Parts and Accessories



1" one time, $4.50; 2" one time, $8.75; 3" one time, $13; 4" one time, $16.75. Write for rates of larger spaces and longer terms.

DEALERS!

Send for our new catalogue before buying accessories. We guarantee lowest prices consistent with quality.

M. M. Sales Company

Reading, Pa.

Peerless Lamp Enamel (Gloss)

Dries in twelve hours on lamps with a high gloss finish. One coat covers solid. If a dull, drying enamel is desired, please specify. 1 gal., $3.75; ½ gal., $1.98; ¼ gal., $1.04; ⅛ gal., $0.54.

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A heavy bodied, high gloss finish, air drying in thirty-six hours. One coat covers solid. 1 gal., $3.75; ½ gal., $1.98; ¼ gal., $1.04; ⅛ gal., $0.54.

Peerless Auto Body Polish

A brightener and restorer to the finish of all old varnished surfaces. Especially adapted for automobile bodies where the life of the varnish is worn out. 1 gal., $3.50; ½ gal., $1.85; ¼ gal., $0.98; ⅛ gal., $0.51.

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A black gloss finish not affected by grease, heat or gasoline. Keeps the engine clean. 1 gal., $3.75; ½ gal., $1.98; ¼ gal., $1.04; ⅛ gal., $0.54.

Peerless Extra Fine Black Baking Japan

For brass, nickel or iron. Bakes to a high gloss, eggshell gloss or dull finish that will not crack, chip or peel. 1 gal., $3.00; ½ gal., $1.60; ¼ gal., 85c; ⅛ gal., 45c.

Ask your dealer and jobber or send direct to us

The Columbus Varnish Company

COLUMBUS, OHIO

Annular Ball Bearings REGROUND

We carry a complete stock of reground bearings of all makes and sizes, for immediate exchange.

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CHICAGO, ILL.

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NEAT, ATTRACTIVE COUPE BODIES BUILT ESPECIALLY FOR FORD CARS. WRITE FOR PRICE AND DESIGN.

PAUL MURRAY, Dealer in Automobile Bodies
518 Ind. Trust Bldg. Indianapolis, Ind.

TIMES SQUARE AUTOMOBILE CO.

WORLD'S LARGEST DEALERS IN NEW AND USED AUTOMOBILES AND ACCESSORIES.

S. W. Cor. 56th St. and Broadway

This Is the Final Week of the Re-Building Sale.

The builders having asked us for more room, we are compelled to sacrifice our large stock of new used cars at heretofore unheard of prices.

Among them we mention:

PEERLESS Limousine, $950; POPE-HARTFORD Limousine, like new, $1,100; PIERCE ARROW Limousine, $800; CHALMERS Limousine, $1,000; REGAL 40 h. p., demonstrator, has been run about 400 miles, $815 (reg. price $1,950); 7 passenger PEERLESS, $750; MITCHELL Touring, $450; OVERLAND Touring, $350; OLDSMOBILE Toy Tonneau, $450; OAKLAND Touring, like new, $600; NATIONAL Roadster, $700; MAXWELL Speedster, $375; MARION Touring, $400; HUDSON Touring, $800; FORDS, all models, $250 upward; FLANDERS, $250; DELEHAY, chassis, $175; Buick Touring, $250 upward; ABBOTT-DETROIT Demonstrators, $850 upward; ABBOTT-DETROIT Roadster, $600; HOTCHKISS Delivery, $400; BUICK Delivery, $350; LOCOMOBILE Delivery, $300; CADILLAC Touring, late model, $750; GUY VAUGHAN chassis, new, $1,250.

CARS SOLD ON TIME PAYMENTS AND OTHER CARS TAKEN IN TRADE.

If You Want to Dispose of Your Car for Spot Cash Consult Us.

Also BIG BARGAINS in a few remaining NEW ALDEN SAMPSON and HERCULES MOTOR TRUCKS, Stoddard-Dayton, Courrier, Roadsters and Regal Touring Cars. All of which all sold practically half the list price.

IF YOU WANT TO SAVE MONEY be sure and send for our free list of automobiles, also the "PRICE WRECKER" FREE.

Times Square Auto Co.

S. W. Cor. 56th St. and Broadway, New York
1210 Michigan Ave., Chicago

TIRES —— TIRES

All New 1913 Stock

Direct from leading tire manufacturers

WHILE THEY LAST

Size.	Casing.	Tubing.	Reliners
28x3	$ 7.20	$1.90	$1.50
30x3	7.65	1.95	1.90
32x3	7.80	2.05	1.95
30x3½	11.00	2.70	2.40
32x3½	12.00	2.90	2.45
32x4	15.70	3.60	2.80
33x4	16.00	3.70	2.85
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35x4	17.50	3.90	2.95

C. O. D. orders sent same day as received upon receipt of 10%, subject to your examination.

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Read Motor Age

APCO——FORD SPECIALTIES

There Are Forty of Them

FREE CATALOG

AUTO PARTS CO. Providence, R. I.

$40.00 Disco Self Starter for $5.00

We are selling these Starters at this enormous reduction to advertise our "Free Price Wrecker," which contains a thousand other bargains. So write immediately and secure one of these well-known Disco Self Starters at less than cost of manufacture. Will make your old car up-to-date.

Times Square Automobile Co.

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An Advertiser in Motor Age Classified Columns writes:

"I am more than pleased with the results I am getting from the small ad I am running in MOTOR AGE and will never be without the ad hereafter."

This Advertiser

has a four-line advertisement stating that he has automobiles and parts for sale.

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We leave it to you.

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The Trading Center of the Motor Car Industry — MOTOR AGE — Rates—25¢ per line Minimum Charge $1.00 6 words to a line

Cars For Sale

A LATE DOUBLE "M" FORTY HORSE-power White Steamer; fine condition and fully equipped, including kerosene burner. Has not run three thousand miles. Will sell cheap. Address Box D 469, c|o Motor Age. w

AUTOMOBILES AND PARTS; LARGEST stock ever known.
Progress Brokerage Co.,
527 Grant St., Buffalo, N. Y.

A "13" CADILLAC DEMONSTRATOR, five passenger, in excellent condition, fully equipped; tires and paint good. Best offer buys it. Box 217, Buckhannon, W. Va.

DEALER IN GOOD SECOND HAND FORDS.
Bodies and equipments of every description.
R. J. Trumbull,
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DEMONSTRATORS, 1913, 67 H. P. SEVEN passenger, perfect order; the strongest cars built; big sacrifice; three cars to select from; write for catalogue. Pilot Car, 17 First St., Troy, N. Y. o

FOR SALE—ACCOUNT BUSINESS RE-verses I will sell my new 1913 six cylinder Hudson 54, bought August 15th, driven 1,000 miles; absolutely good as new; extra tires, chains and Klaxon horn. Must have cash; no trades. Address Box D 520, c|o Motor Age. w

FOR SALE—SECOND-HAND TRUCKS.
4 Decatur 1½-ton trucks.
1 Randolph ¾-ton truck.
1 Rapid 1-ton truck.
1 5-passenger Corbin touring car.
2 500-lb. light trucks.
Apply to L. W. Coppock at old plant Grand Rapids Motor Truck Co., Grand Rapids, Mich. Phone Citz. 7487.

FOR SALE—NORWALK UNDERSLUNG Six, Model A, Two-Passenger Roadster. Very little used. Have purchased 1914 Model with Electric Gear Shift, reason for selling. Right price to quick buyer.
T. G. Coppersmith,
126 W. Exchange St., Martinsburg, W. Va.

FOR SALE—ONE MODEL "O" WHITE steam car, fully equipped and in good shape; a bargain; to be sold at once. W. H. Ramsey, 506 North Eleventh St., Newcastle, Ind.

FOR SALE—SECOND-HAND AUTO, 40 h. p., four-cylinder; suitable to convert into truck car. Barber Asphalt Paving Co., East Delavan and Fillmore Aves., Buffalo, N. Y.

FOR SALE—4-PASSENGER, FOREDOOR, 1912 Henry; all equipment, good tires and overhauled. Best cash offer. William Gibson, 5424 Kimbark Av., Chicago, Ill. H. P. 1439.

LANCIA, 20 H. P. MODEL WITH ROOMY but small appearing five-passenger touring body. Fully equipped. In thorough mechanical repair. Owner, Box 844, New York. 1

MAXWELL 2 CYLINDER RUNABOUT, 16-horsepower. In first class condition. First cash offer in reason takes it. Will trade for good lathe. Lenora Blacksmith Co., Lenora, Kansas.

MITCHELLS, REBUILT, GUARANTEED.
These cars are fully equipped. Call or write for further particulars.
Mitchell Automobile Co.,
2334-36-38 Michigan Ave., Chicago.

NEVER BUY AN AUTOMOBILE UNTIL you know the material used, satisfaction it gives, objectionable points, etc. Undecided? Ask us. Folder, "Foresight in Auto Buying," free. Dept. J., Professional Information Assn., Hartford, Conn.

SELDEN, 1912, 5 PASSENGER, FULLY equipped, demountable rims, with extra tire and rim. Up-to-date in every way. A good buy for someone wishing a good car at a low price. Condon, 2635 Wabash Ave., Chicago.

SIX-CYLINDER, FIVE-PASSENGER 1913 Hudson touring car, almost new. Owner moving to southern timber country where automobiles cannot be used. Inquire E. S. Haas, 3747 Hazel Ave., Cincinnati, Ohio. w

VERY FAST STUDEBAKER RACING CAR for sale cheap, or will trade for roadster or truck.
Wolke Cycle Co., Louisville, Ky.

"30-60" 5 PASSENGER STEARNS, JUST overhauled and repainted, new tires, demountable rims, with new extra tires. This is a snap for some one wishing a high-powered car at a bargain. Condon, 2635 Wabash Ave., Chicago.

Parts and Accessories FOR SALE

ACCESSORY CATALOG MAILED ON RE-quest. Maxwell dealers and owners, we can supply tops, shields, etc., for your cars. Lowest prices, all goods. Write us. Westchester Accessories Co., 1777 Broadway, N. Y. City.

A Good Reason

"We do not care to repeat the advertisement in reference to the Knight car at this time. We sold it through the MOTOR AGE advertisement. That's why."
H. H. W.

ACME REPAIR PARTS
We carry a complete stock of parts for all types of Acme cars. Can ship promptly
Adam E. Arnold, 212 S. 11th St., Reading, Pa

AMERICAN GASOLINE SAVER.
Every car owner should have one, guaranteed to save 25% on gasoline expense. The most rapid selling automobile device on the market.
Agents wanted. Price $4.00.
Write for exclusive territory today.
AMERICAN RUBBER PRODUCTS CO.,
26 S. Clinton St.,
Chicago, Ill.

ATTENTION—HENRY OWNERS

Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars
Muskegon Automobile Co.,
Muskegon, Mich.

A WHITE STEAMER, GENERATOR AND burner, almost new. Will sell cheap. Address Box D 245, c|o Motor Age. w

AUTO BODIES, WINDSHIELDS, WHEELS.
250 new panel top delivery bodies, some panel top, some open express with flare boards. Will fit three-fourths of autos made. $28 to $45. Folding plate glass windshields, $10 complete. New 32-inch wheels with solid rubber tires, only $12 each. Benedict Co., 63 Winder St., Detroit, Mich.

AUTO PARTS MAKERS.
Repair and service parts for many cars. We own all patterns and parts in stock for Elmore, Warren, DeMott, Welch, Rainier, Marquette, De Luxe and other cars. Complete stock.
Puritan Machine Company,
Detroit, Mich.

BALL & ROLLER BEARINGS.
All Types and sizes.
We also repair or exchange all makes of ball bearings.
THE GWILLIAM CO., 253 W. 58th St., N. Y.;
1314 Arch St., Philadelphia.

BARGAINS.
Viso spark plugs; a glance shows missing cylinder; solves ignition troubles. Sample mailed on receipt of 25c. Storage batteries $7.50 to $16.00. Electric head lamps only $7.50 pair.
The Ampvo Battery Co.,
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BARGAINS.

Paint your Ford Car for	$ 5.00
Sheldon one-ton truck axles, per pair	25.00
One ton truck wheels with rims, per set of four	8.00
One ton wheels and tires, second-hand, per set of four	30.00
One truck steering gears	17.50
Four-cylinder motors, new	77.00
K. W. high tension magnetos	25.00

Get our No. 800 bargain sheet.
AUTO PARTS CO.,
517 W. Jackson Blvd.,
Chicago, Ill.

BARGAINS—BARGAINS—BARGAINS

Is the only thing we handle, from a cotter pin to a complete car. Small and high-powered cars, engines, frames, bodies, axles, radiators, transmissions, magnetos, tops, etc. Before buying let us quote.
Pacific Motor Car Exchange Company,
10 West 62nd St., New York.

BEARINGS—TIMKEN, HESS-BRIGHT, S. R. B., R. I. V., and other makes, 60 to 80 % discount. Most all sizes. Tell us size you want or send for our complete list.
AUTOMOBILE APPLIANCE CO.,
1714 S. Michigan Ave., Chicago, Ill.

BERGDOLL REPAIR PARTS.
The repair business of the Bergdoll cars, together with all drawings, jigs, patterns, etc., has been purchased by us. We have a complete stock of repair parts for all models on hand and orders for parts for Bergdoll cars should be placed with us direct to save time.
Louis J. Bergdoll Motor Co.,
124 N. 3rd St., Philadelphia.

BETTER LIGHT FOR 1-5 COST OF ELEC-tricity. Suitable for home or Store. Easily installed, no experience necessary, big demand. Write for FREE catalogue. Doud Lighting Co., 175-F N. Sangamon, Chicago. g

CUT-OUTS.
E.M.F., Flanders, Buick, Regal, etc. Complete outfit with brass lock open pedal, $1.50.
Lincoln Machine Shop, Lincoln, Ill.

BRAND NEW WINDSHIELDS

80 CENTS ON THE DOLLAR.

All sizes; black, brass or nickel; straight or zig-zag. French plate glass. Give size, style and finish desired.

BRAND NEW TOPS

Made for Flanders "20" touring cars. Made of finest mohair; complete with irons, side and storm curtains. Can be fitted to FORD, FLANDERS "20" and BUICK "10" touring cars. Price $11.85.

ERWIN GREER & COMPANY,
1456-64 Wabash Ave., Chicago.
Accessory Dept.

COMPLETE "VULCAN PROCESS"
of oxy-acetylene welding
plants from $175 for the blacksmith and garage plant up to largest made. Torchlight weight. No backfiring in ordinary work. Write today for our booklet on welding.
Vulcan Process Co.,
25th and University Ave. S. E.,
Minneapolis, Minn.

CRANK-CASE—IN GOOD CONDITION FOR Cameron; 24 H. P. motor.
Guy D. Primm,
Athens, Ill.

DOES YOUR MOHAIR AND CANVAS TOP leak? Coleman's Waterproof Filler will make it rainproof. It will not stiffen or change the color. Virginia Waterproofing Corp., Arcade Bldg., Norfolk, Va.

DRAGON REPAIR PARTS.
We manufacture and keep on hand all repair parts for the Dragon cars. We make a specialty of repairing this machine. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

FORD CAR WIRE WHEELS.

Demountable wire wheels interchangeable all around, built especially for Ford cars. Five wheels to a set, enabling you to carry spare wheel with inflated tire, and make quick change.
THE F. & H. WIRE WHEEL CO.,
Columbus, Ohio.

FORD DEALERS.
The best accessory that we can put on a FORD car is our foot-throttle, which we have been trying out for the last two years. Big out-put and remarkably low figure on quantity orders. For particulars write Peoria Accessory Co., 817 Main St., Peoria, Ill. m

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FORD FAN BELTS, WOVEN COTTON AND silk; outlasts six regular belts. Postpaid, 60c. Dealers, write. Angier's, Streator, Ill.

FORD OWNERS—WE CAN MAKE YOUR car the easiest rider made with light or heavy load; no jolt, no jars, no upthrow. Write us. Thomas Auxiliary Spring Co., Canisteo, N. Y.

FORD, HUPP AND MAXWELL
Muffler cut-out, machined ready to attach, including lock open pedal string and cables. $1.35. Lincoln Machine Shop, Lincoln, Ill. c

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FORD LIGHTING OUTFITS, $5.50.
Includes parabolic reflectors, tungsten bulbs, wiring switch and free delivery. Truscott Auto Supply Co., St. Joseph, Mich.

FORD OWNERS AND DEALERS!

You will save trouble and money by installing our timer elevating device.
Ford Parts Specialty Co.,
1211 Main St., Richmond, Ind.

FORD OWNERS—FORD DEALERS
Perfect lubrication with Pedersen Sight Feed Oiling System. Designed especially for Ford Cars. Write for special agents proposition.
Rowland & Lopez,
1777 Broadway, New York City.

FORD OWNERS—OUR SPARE DEMOUNT- able wheel cures tire trouble on road. Doctors, attention. Write Angier's, Streator, Ill.

FORE-DOOR BODIES, SIX AND SEVEN passenger; painted, not upholstered. Price, $25.00.
AUTOMOBILE APPLIANCE CO.,
1714 S. Michigan Ave., Chicago, Ill.

FORD OWNERS.

Enter your order with us at once and take advantage of the following bargains while they last.

Ford Lighting Outfits	$ 5.50
Clamp On Ford Bumpers	4.00
Spark Plugs	.35
Electric Horns, "Electra and Bulldog"	2.90
Ford Oil Gauges	.35
Ford Valve Stem Adjusters	1.25
Tires 30" x 3", New	9.75
Tires 30" x 3½", New	14.00

Write for list on other bargains. Terms, cash with order. Money back if not satisfied.
AUTOMOBILE SUPPLY & MACHINE CO.,
50 Rowland Bldg., Detroit, Mich.

FORD T. OWNERS.
Foot throttle or accelerators, $1.50. Lincoln Machine Shop, Lincoln, Ill. c

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FORE-DOORS AT CUT PRICES.

Mr. Auto Owner and Dealer: If your car is without fore-doors, write today for bargain prices; to reduce stock.

DEPT. D., AUTO SPECIALTY MFG. CO.,

326-30 E. Market St.,
Indianapolis, Ind.

More Than Satisfied

"Please change our advertisement to read as per enclosed matter. Run until further notice. We have steadily secured excellent results from our ads in MOTOR AGE and are more than satisfied."

L. D. S.

FORE DOORS

We are prepared to make prompt shipment from stock and guarantee the doors to fit or money returned.
F. E. LORTZ CO.,
1547 So. Mich. Ave., Chicago, Ill.

FOR SALE.
2 cylinder upright, 8 H. P., Cushman gas engine and Northern generator, 65 volts, 17-35 amperes. Complete with truck, belts, switches and all equipment. Nearly new. Give best offer first letter. Address Plaza Theatre, Box 432, Springfield, Minn. e

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FOR SALE.

36-42 H. P. "L" Head Motors, 4¾ x 5 (Continental type), with cone clutch	$250.00
Brown and Lipe sub-frame transmission, three speeds forward and one reverse, with shifting quadrants and lever "H" shift	50.00
Cone clutches with joint and cross and spring	12.50
18" hand wheel worm and gear steering gears (Gemmer type)	12.50
Sheldon front and rear axles, shaft drive for car up to 30 H. P. with artillery wheels and demountable rims	82.50
A. O. Smith steel frames for 110-inch wheel base	10.00
Driggs-Seabury heat treated steel frames for 121-inch wheel base with kick up for three-quarter elliptic springs with all fittings for springs front and rear and standard-size sub frame	15.00
Brown and Lipe shifting levers "H" with quadrants	12.50
Radiators with bonnet ledge for cars up to 30 H. P.	11.00

Apply to G. J. G. Motor Car Company,
White Plains, N. Y.

FOR SALE—CINO RACING MOTOR, COM- plete with double spark Remy racing magneto, $175.00. Model N Ford engine and transmission, $75.00. Three speed Brown Lipe trans. selective type, $40.00. Double chain drive Apperson transmission, $40. 50 H. P. Pope Toledo engine, $75. 24 H. P. Pope engine, $50. Pope Toledo parts for sale. Auto-Salvage Co., 1436 Wabash Ave., Chicago.

GET WRIGHT
Radiators for Replacement.
Built for any car made. Prompt shipment Get our prices.
Specials This Month.
Buick 17—$34.00 Velie 30—30.00
Hudson 20—$32.00 Hupmobile 32—$30.00
Wright Cooler & Hood Co.,
8th St., Muskegon, Mich.

FOR SALE.

Enclosed Automobile Bodies.

Special prices on Limousine and Landaulet bodies, either trimmed or untrimmed. We carry a complete stock of parts for all models of Thomas cars. We have a thoroughly equipped repair shop and machine shop. We can overhaul or rebuild your Thomas, and give you the best of service. We have the men who built the Thomas cars and who have been trained at the factory for years.
E. R. Thomas Motor Car Company,
1200 Niagara Street, Buffalo, N. Y.

GOULD $50.00 AIR COMPRESSORS FOR $18.00. Ford outfits $4.00 complete. Fred Allen Automobile Supply Co., 1610 S. Michigan Ave., Chicago, Ill.

HAYNES MODEL W—2ND HAND PARTS
—Practically complete car in parts as wanted at 25% value. Includes magneto. No tires or crankshaft. Good condition.
Farm Mutual Tel. Co.,
Grimes, Ia.

LION REPAIR PARTS.
We have on hand a complete stock of repair parts for all models of Lion Cars.
Lion Motor Parts Co.,
124 N. 3rd St., Philadelphia, Pa.

MAGNETOS: WE HAVE 2,000 MODEL X
Splitdorf Magnetos, new. Price, without coil, $17.50 each; with coil, $25.00 each.
The regular price of these is $75.00.
We also have other makes of magnetos at cut prices—in fact, everything for the automobile. Send for "OUR PRICE WRECKER"—the greatest money saver in the world.
TIMES SQUARE AUTO CO.,
1210 Michigan Blvd., Chicago, Ill.
S. W. Cor. 56th St. & Broadway, N. Y. City

MAKE CASH OFFER FOR
O. B. PORTABLE AIR COMPRESSOR.
Practically new, suitable private or small public garage. Bids kept open one month. Any bid may be rejected. Address Box D 512, c|o Motor Age. h

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MORA REPAIR PARTS.
We purchased the repair business of the Mora Company and have in stock repair parts for all models of Mora cars.
Philadelphia Machine Works,
67 Laurel St., Philadelphia, Pa.

MOTOR AGE
Is bringing us results—we should worry. Making friends east and west because we hold the keystone to maximum carburetter efficiency. The best thing on this page. The J. & B. automatic auxiliary air valve is NOT a misnomer. It is The Efficiency Promoter. A single unit and self-operating. Get interested.
Attach and Get Wise.
Don't be circumspect. Your good will is our chief desire and asset. If the J. & B. cannot beat the Happy Medium on the every-day economy run we have no argument. Ours is; all the time. $3.75 gives ten days' option to retain or reclaim. Warranted for service and forever. Information? Jones & Buckoke, Germania Auto Repair, 1551 N. La Salle St., Chicago, Ill.

MR. (FORD) OWNER AND GARAGE MAN,
The Townsan Valve Adjuster has a cushion for your valve-stems. Takes away the click, absolutely silencing the valves. No screws or burrs to work loose. Saves putting in new push-rods and valve-stems. They never wear out. Price $1.50 by mail. Ask your jobber, or address Townsan Auto Specialty Co., Mitchell, S. D.

RADIATORS, 40 TO 60 HORSEPOWER, $22.
Get our list of bargains.
AUTOMOBILE APPLIANCE CO.,
1714 S. Michigan Ave., Chicago, Ill.

NEW FORD WINDSHIELD $8.75 (NET)

Worth $22.50 to $27.50.

We do not care to assume the risk and expense of moving our windshield stock from our former location, 250 West 54th Street, to our new quarters in the Bush Terminal, therefore, we will sell
VANGUARD FRICTION, STRAIGHT OR ZIGZAG
(Brass or Brass and Black combination)

at the closing out price of $8.75—less than the cost of manufacture. Guaranteed to fit the Ford car. Send your order with check at once to avoid disappointment.

EMIL GROSSMAN COMPANY,
Model Factory No. 20, Bush Terminal,
Brooklyn, (New York City).

RADIATORS.

Every radiator guaranteed absolutely new, not a reconstructed one.

In stock for immediate shipment.

Ford Model "T"	$18.00
Buick 10-14	27.50
Buick F-16-17-19-26-27-28	35.00
Hudson 20	33.00
Chalmers F-40	30.00
Hupp 32	25.00
E-M-F 30	30.00
Anhut	15.00
Northern C	32.00
Wayne 30	35.00
Special 40 H. P.	15.00

5% discount allowed for cash with order, otherwise one-third cash with order, balance C. O. D.

AUTOPARTS MANUFACTURING COMPANY

453 Trombly Avenue, Detroit, Mich.

RADIATORS—NEW GUARANTEED GOODS

Ford, Model T	$16
Buick, Model 10	22
Buick, Model F	25
Chalmers-Detroit	20
Everett	20
Stoddard-Dayton	25

Any other make required at equally low prices.

The Times Square Automobile Co.,
1210-1212 Michigan Ave., Chicago.

RIMS, RINGS AND RIM PARTS FOR ALL rims made. Send for our rim part catalogue.

KASTNER TIRE AND RIM CO.,
2112 Michigan Ave.,
Chicago, Ill.

"SAVE YOUR GASOLINE."
We have 150 Rayfield carburetors, regular $20.00 kind. Our price, $8.20 while they last.
PURITAN MACHINE CO.,
415 Lafayette Blvd., Detroit, Mich.

SCHEBLER MODEL "L" CARBURETORS, new, 1½-inch, $8.00 each. Order early. Kent Motor Car Co., Kenosha, Wis.

SEAT COVERS FOR ALL CARS.

Special price on Ford seat covers. We make a specialty of Ford commercial bodies.
Auto-Cape Top Co.,
2334 Michigan Ave., Chicago, Ill.

ONE SET OF VALVE STEM ADJUSTERS free with every order for any of the following Ford specialties:

	Reg. Price.	Cut Price.
Master Vibrator	$10.00	$ 5.60
Ford seat covers complete with top hood	25.00	10.50
Ford rear end tire holders	4.00	2.25

Send for 96-page illustrated cut-price catalogue.

Dept S. Liberty Tire Co.,
102 Chambers St., New York City.

SPECIFY A DIM-A-LIGHT ON YOUR NEW car. Turning a switch reduces headlights 25 per cent. Write us for information.
PELLETS MAGNETO EXCHANGE,
1463 Michigan Ave., Chicago, Ill.

SHINAUTO—THE GREAT PRESERVER.

Keeps auto like new without washing. Prevents cracking and checking of varnish. Makes old cars like new. Guaranteed. Saves paint bills. Trial can, 50c by mail. Enough for two months' treatment.

SHINAUTO MFG. CO., INC.,
1137-1139 No. Illinois St., Indianapolis, Ind.

SILVER PLATING WITH U-KAN-PLATE Polish. Small capital; profitable work.
A. R. JUSTICE CO.,
619 Chestnut St. Philadelphia, Pa.

START YOUR FORD THE COLDEST morning with a single cranking. For 50 cents I will send you detailed sketch of a little device that I have used on my Ford the past three winters with absolute success. Can be made at your local shop for 50 cents. No priming, no cussing, no sweating. She will run on the first spin, or money back.

D. H. Livingston, Cedar Rapids, Ia.

THE REAR LIGHT ALARM
is one of the most important inventions in the history of motoring. It is a device which audibly indicates when the rear light is out. The cause may be a broken bulb or filament, faulty connection or broken wire; any of which causes the
REAR LIGHT ALARM
to instantly sound. One fine saved will pay for it; lives may be saved by its use. Sent from the factory complete with a length of wire for connecting and full directions for installation; $5.00 postpaid.
THE GUARANTEED SPECIALTIES CO.,
NEWARK, N. J.

Positions Filled

"I have filled the positions referred to, and have received numerous applications, so discontinue the ad. Rest assured that when we need additional salesmen, we will take pleasure in giving you the advertisement." E. H. C.

TOURING, ROADSTER, RACING BODIES. Seats, special and stock sizes. Radiators, hoods, tanks and fenders for any car. Get our prices.
Auto Sheet Metal Works,
1534 Michigan Ave., Chicago.

TOPS BUILT, RECOVERED AND REpaired. Also Top Covers, Radiator Covers, Luggage Cases, Celluloid, etc. C. G. Meyer & Son, Tiffin, Ohio.

TRUFFAULT-HARTFORD SHOCK ABsorbers; $45.00 kind; $20.00 set of four.
PURITAN MACHINE CO.,
417 Lafayette Blvd., Detroit, Mich.

UNION OXY CARBIDE CO.
Manufacturers of Portable (weight 40 lbs.) and stationary welding, cutting or lighting plants; supplies of all kinds. Agents wanted. Fulton & Enfield Sts., Brooklyn, N. Y.

WE MAKE FORD RACING TYPE BODIES in several models for immediate delivery.
AUTO SHEET METAL WORKS,
1532 Michigan Ave., Chicago, Ill.

WE NOW HAVE BUT A FEW 30-35 AND 35-40 H. P. motors ready for shipment. Complete with magneto, coil and clutch. F. E. Alford, Goshen, Ind.

WESTON MOTT HIGH GRADE REAR axles, $45.00. Other bargains, too.
PURITAN MACHINE CO.,
413 Lafayette Blvd., Detroit, Mich.

VELVET.

	List Price.	Our Price.
Velvet shock absorbers	$28.00	$10.00
Stewart speedometer complete	25.00	12.50
Rain vision windshields, any finish	35.00	12.00
Ford rubber mats		1.00
Ford endless fan belts		.30
Ford E. Z. engine starters		6.00
Ford electric light outfits		3.50
Honeycomb radiator		10.00

CUT RATE AUTO SUPPLY STORE,

438 Rush Street,

Chicago, Ill.

WHITE STEAMER PARTS—ONE MODEL "M" engine complete; one Model "O" engine complete, generators, burners, axles, wheels, springs, and numerous other parts for any model cheap. Also one fine seven-passenger straight line touring body cheap. One fine 20-H. P. White Steamer, $250. Address Box D 540, c|o Motor Age. w

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2,000 GALLON GASOLINE SECOND HAND storage tank, 3/16" boiler plate, painted, tested and guaranteed; 14" screw top with pressure blow off. Will sell cheap. Martindale & Millikan, Franklin, Ind.

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50 NEW PRESSED STEEL FRAMES 163" long, 34" wide. Each $10.00. Send for sketch.
Lucas & Son, Bridgeport, Conn.

$850.00 MOTORS FOR $350.00.

These are new 5x6 four cylinder, high grade, heavy duty motors. Have not power enough for our use. These motors list at $850.00. We are offering them in lots of one or more for less than they cost us in lots of a hundred. Just the thing for trucks or small tractors. It will pay you to investigate.

570 Prior Avenue, St. Paul, Minn.

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FUR LINED OVERCOATS AT ONE-fourth value. Manufacturers' samples. Gentlemen's imported black broadcloth overcoats, lined with finest Australian mink, large handsome Persian lamb collar. All sizes. Retail value $120. While they last will be sacrificed for $35 each. First come, first served. You take no risk. Examine and try on before paying. Write today, stating size, enclosing express charges only, and coat will be sent at once. E. Roberts, Room 7, 160 West 119th St., New York.

Cars Wanted

FOR SALE OR TRADE—USED TAXICAB bodies. Will trade for small car.
E. B. Collins,
Danville, Ill.

WANTED—AUTOMOBILE; IN EXCHANGE for 50 acres of No. 1 fruit and farming land; good barn; good well and windmill. Byron Overhiser, Fennville, Mich.

WANTED—CHEAP FORD OR FLANDERS auto.
Wolke Cycle Co.,
Louisville, Ky.

For Sale or Exchange

SEVERAL FIRST-CLASS MOTORCYCLES for sale or trade for automobiles.
Wolke Cycle Co.,
Louisville, Ky.

Situations Wanted

A LICENSED A. A. A. RACING DRIVER wishes to sign up with private owner or factory for 1914 races, or take the part of chauffeur this winter for private party. Address Box D 521, c|o Motor Age. w

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A SUCCESSFUL SALESMAN WHO HAS secured connection with half million concerns as salesmanager, desires position with accessory manufacturer. Knows personally the car manufacturers and jobbers throughout country. Box D 541, c|o Motor Age. c

ENERGETIC YOUNG MAN, SOME EXPErience, desires change with a concern in garage, factory, or private. Best of references. Bayne F. Rings, Webster, Ill.

FORD REPAIR MAN AND DEMONSTRAtor desires change; steady job; working knowledge of all cars, understands Delco System; married, temperate, industrious. Box D 516, c|o Motor Age. o

POSITION WANTED AS FOREMAN OF AUtomobile repair shop by first class mechanic of long experience. Desires a position that will be permanent and where good salary will be paid for faithful and efficient service; west or northwest preferred. Address Box D 501, c|o Motor Age. c

POSITION WANTED AS GARAGE MANager and assistant salesman. Desires position that will be permanent with good pay. Am at present employed in similar position. Best of references. For particulars address Box D 539, c|o Motor Age.

POSITION WANTED BY AN EXPErienced mechanic and driver, with some northern owner of a high-grade automobile, as chauffeur during the summer and fall; absolutely sober and reliable; for further particulars address Box D 447, c|o Motor Age. r

POSITION WANTED—MANAGER FIRST class garage or foreman first class repair shop. Eight years' experience; expert mechanic; reliable; sober. Only solid firms answer. For further particulars address R. J. Marquard, 405 No. 6th St., Springfield, Ill.

SALES MANAGER OF MOTOR TRUCK manufacturing companies desires to make a change. Address J. B. H., c|o Motor World, 1600 Broadway, New York City.

TRAVELING POSITION WANTED TO cover the western coast, to close up car sales, contracts or accessories. Twenty years' experience. Box D 536, c|o Motor Age. k

WANTED—POSITION BY EXPERT MEchanic; nine years' experience; married and temperate. Am competent to manage. Am running a shop now. Will take anything reasonable. I have personal reasons for wanting to change. Would prefer west of the Rockies, or any west coast state. Box D 542, c|o Motor Age.

Help Wanted

GOVERNMENT JOBS FOR MEN AND women; $65 to $150 month. Common education sufficient. Thousands of appointments every year. Write for free book of positions available. Franklin Institute, Dept. W 71, Rochester, N. Y.

HIGH GRADE AUTOMOBILE MEN—APplicants and employers write us concerning available positions in every branch of the industry. Toledo Engineering Agency, Toledo, O.

WANTED—LIVE RESPONSIBLE AGENTS who mean business, to sell the only filter on the market that will **separate water from gasoline** and similar oils. Something every automobile owner ought to have. Address H. H. B., P. O. Box 52, Station A, Detroit, Mich.

WANTED—NEAT APPEARING AUTO MEchanics, with good references, in all small towns, to make installations of automobile devices for us. Address Halliwell Co., 408 West Pico St., Los Angeles, Cal.

WANTED—TRAVELING SALESMEN WHO have sold high priced cars. Must have wide acquaintance with best dealers and able to secure high class business. Write fully, stating territory with which you are best acquainted and give all details. Box D 531, c|o Motor Age. n

Wanted—Agents

WANTED — AGENTS TO SELL JIFFY Auto Curtains in unallotted territory. Address
Hercules Rubber Co. (Jiffy Curtain Division),
2 Hudson St., New York.

Business Opportunities

AUTOMOBILE DISTRIBUTING BUSINESS

For sale. Located in western Iowa. In a flourishing condition. Good reason for selling.

Box D 535, c|o Motor Age. r

AUCTION SALE OF MACHINERY

On Tuesday and Wednesday, October 28th and 29th, commencing at 10:30 a. m., both days we will at Moline Ill., sell at public auction, in lots and parcels, all the assets belonging to the estate of Midland Motor Co., bankrupt.

CONSISTING OF OVER

100 pieces of MACHINERY, 20 Motors, $6,000 worth of standard shop TOOLS, entire tin and paint shops, etc.; 250 tons of brass tubing and hundreds of tons of brass, copper and aluminum, steel and iron finished and rough castings.

Also the LARGEST AND BEST STOCK OF STANDARD AUTOMOBILE PARTS EVER SOLD AT PUBLIC AUCTION.

3 AUTOMOBILES AND 3 MOTOR TRUCKS

We will also offer for sale the GOOD WILL OF THE BANKRUPT CONCERN, and the Real Estate, full description of which can be secured by applying at the undersigned firm's office. Descriptive circulars will be sent upon application.

SAMUEL L. WINTERNITZ AND COMPANY, AUCTIONEERS.

Rector Building, Chicago, Ill.

FOR SALE.

Williams Machine Co.'s complete steam vulcanizing plants: 3 moulds, steam generator, buffing wheel, air compressor and tank; all forms, bead moulds and air bags. Everything complete for vulcanizing. Will sell at bargain. Used one year. Box 142, Roswell, New Mexico.

FOR SALE—COMPLETE VULCANIZING plant consisting of boiler, 2 Miller moulds, 1 Fisk mould, double tube plate, inside core, tire lasts, air bags, cement mixer, rubber tools and all necessary valves, unions and piping. Will close out cheap. W. H. Clausen, Gladbrook, Iowa.

FOR SALE—CYCLE CAR ENG. PATterns. Four cycle, single, double, opposed and three cylinder vertical air and water. G. M. Johnston, South Haven, Mich.

FOR SALE—EXCLUSIVE FORD SHOP, with over four hundred customers, also manufacturing a Ford accessory. Complete plant, with tools, jigs, parts, accessories, machinery, etc. Investment required, about $12,000. Reason for selling in first letter. Box D 538, care Motor Age. a

FOR SALE IN NORTHERN ILLINOIS—A fine auto and tire repair business in a good town with plenty of cars to work on. Will invoice about $2,000, will sell for $1,500. I have done $6,000 worth of business in 6 months. Good reasons for selling. Write for particulars. Will sell machinery and tools separate if desired. Box 537, care Motor Age. f

FOR SALE—MACHINE SHOP AND GARage; will invoice about $3,000; no opposition; a money maker. The Ford agency can be had for the county.
City Garage and Machine Shop,
Buffalo, Okla.

I WILL INVEST

$50,000

IN THE AUTOMOBILE BUSINESS.

The owner and controller of a large eastern plant is desirous of turning same into an automobile or accessory manufacturing plant.

The plant is now in full operation along other lines, but for business reasons, which will stand the closest investigation, it is desirable to make the above change.

The main building of the plant in question is of brick and heavy mill construction, 3 stories, and contains about 7,000 sq. ft. floor area, and would carry any machinery needed for the change referred to without alterations. Other brick additions to plant contain about 6,000 sq. ft.

The plant is equipped with automatic sprinklers throughout and occupies about one acre of ground, situated conveniently to railroads, in a town that is now in an ideal position from the standpoint of labor, for an industry of this kind.

The owner of the property would like to become actively interested in the automobile business that may be located in this plant and would consider the property as his part of the investment. In every particular, as above intimated, this proposition will bear the closest investigation. Immediate correspondence is invited. All communications will be held strictly confidential.

Address Box D 527, care Motor Age,

Chicago, Ill.

INVENTIONS EXAMINED, PATENT AND
Working Drawings made. Models developed and built. Free report as to patentability and cost for development of your invention. Address Inventions Dept., The Toledo Engineering Agency, Toledo, O.

VULCANIZING PLANT. LARGEST AND
best equipped plant west of Chicago; only one in town of 30,000 people. Reasons for selling, business opportunity in the South. Good paying proposition to right party. Address Babcock Tire & Rubber Works, Burlington, Iowa.

WANTED—SOMEONE TO FINANCE THE
manufacture of patent automobile accessory. Nothing on market that does the same work. Will guarantee ready market and several hundred percent profit on each sale. If interested write for further information, description and cuts of article. Address Box D 514, c|o Motor Age. p

WE ARE OFFERING FOR SALE OUR
well-known tire filler manufacturing business, complete with formula, machinery and good will. A big business for the right parties. $25,000 to $50,000 can be made each year if properly handled. Other business requiring all our attention our reason for selling. Write for particulars and sample. Address W. O. Dayton, 351 Beach St., Joliet, Ill.

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EXCEPTIONAL BARGAINS IN NEW AND
used tires and tubes. Repairing a specialty. All work guaranteed. Write or call for prices. Empire Vulcanizing Co., 2400 Wabash Ave., Chicago. Cal. 4565. Open evenings.

SPARE RIMS
Continental Old Style
36 x 4½, $2.00.
Motor Tire Sales Co.,
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Write for Tire prices.

TIRES GUARANTEED FOR 3,500 MILES
Special Make
For Ford Automobiles.
30 x 3, $10.90.
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This stock limited—be quick; 10% with order, balance C. O. D.
R. J. TRUMBULL,
1334 Michigan Ave., Chicago.

ORIGINAL COST REDUCED

AND MILEAGE DOUBLED

Before buying your tires, consult us. We guarantee to double your mileage and save you money in the transaction.

We send you any shoe of standard make with the maker's guarantee at a low figure.

We also send you with each shoe one of our Security Reliners which is guaranteed absolutely to double the tire makers' mileage and thereby save you untold expense, at a special price according to the size desired.

You can't afford to overlook this proposition. Specify size of shoe desired, and get one of the best propositions ever offered to any owner.

SECURITY RELINER CO.
Agency Dept.
250 W. 54th St., New York City.
103 Spring St., Montgomery, N. Y.

TIRE REDUCTIONS!!
Standard makes. High quality stock. We ship on approval within 400 miles. No money in advance. We pay expressage on orders of 2 or more tires where cash accompanies same.

Size	Tires	Tubes	Size	Tires	Tubes
28-3	6.95	2.30	33-4	14.50	4.20
30-3	7.85	2.35	34-4	15.00	4.35
30-3½	9.85	3.20	35-4	15.25	4.50
31-3½	10.45	3.25	36-4	15.75	4.70
32-3½	10.60	3.40	35-4½	19.00	4.80
34-3½	10.95	3.60	36-4½	19.50	5.50
31-4	13.00	3.90	37-4½	20.00	6.50
32-4	13.90	4.05	37-5	23.50	6.65

All fresh new stock, regular firsts, slightly blemished and giving from 3,000 to 4,000 miles.

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TIRES. TIRES.
I will sell you good wrapped tread clincher tires cheaper than any one in the United States. New 1913 stock. 34x4 Case, $14, all other prices accordingly. Write for prices.
D. Ogden,
Columbus, Ind.

TIRES—NEW AND USED—TUBES
All standard makes. Call or send for price list. Repairing by experts.
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TIRES—$20,000 WORTH—TIRES.
New 1913 fresh standard makes. We're buying in large lots direct from the best manufacturers of Akron, O., and selling at a small profit to move it quickly. Send for price list. Serlin Tire Co., 1073 14th Place, Chicago, Ill.

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Your opportunity if you own a Ford, have salesman's ability, and live in a small town where we have no agency for

STODDARD'S FORD TIRES

Twenty-five per cent Heavier—Tougher—and Stronger cases—and Heavy Red Tubes.

These tires make your car ride easier—give you more mileage, save too frequent blowouts and other tire trouble.

We make 30 x 3½ and 30 x 3 cases and tubes only—make them in large quantities from the best Para Rubber procurable and 400 lb. test fabric. But by eliminating detail expense necessary in factories where 104 different sizes and types are made we have reduced manufacturing costs and pass this saving along to our customers.

Wire or write us immediately for full information, prices and agency proposition. You can save on your own tires—give your friends a better tire with more wear for the money and make a good profit yourself.

Get your name in today before your neighbor does.

C. H. STODDARD RUBBER TIRE WORKS

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MAGNETOS
Repaired, remagnetized; prompt service on all makes.
Get our exchange proposition on new K-W for old equipment.
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GOOD PRIVATE AUTO GARAGES, $58
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new pistons and rings fitted. Garage Air Compressors. Cast Iron Brazing Co., Manchester, N. H.

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General Machine Work
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Exclusive Ford Repairs.
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Phone Cal. 5246.

CYLINDERS REGROUND
And fitted with new pistons and rings.
EXPERT REPAIRING AND REBUILDING
Old parts satisfactorily repaired or duplicated. Cracked cylinders, gear cases, etc., perfectly welded and machined. Aluminum, bronze and brass castings of any design.
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CYLINDERS REGROUND AND FITTED
with new pistons and rings for $7 to $11 per cylinder. We do this class of work exclusively and are thus able to give you the highest class of work at these prices. The Crown Machine Shop, Crown Point, Ind.

CYLINDERS REGROUND,
New pistons and rings Fitted. Gear cutting of all kinds. Racing and special motors designed and built.
McCADDEN MACHINE WORKS,
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CYLINDER REGRINDING

NEW PISTONS NEW RINGS

properly fitted.

Work finished on Heald and Norton grinders.
We guarantee to increase your power, control and economy, and eliminate piston knocks.
Write for prices stating bore, number of cylinders and make of engine.

AUTO ENGINE WORKS,
University Ave. and Griggs St.,
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NICKEL PLATING OF OLD CARS OUR
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and fitted with new pistons and rings for $15 per cylinder. We make parts and cut gears of all kinds. Send us your old parts and we will repair or duplicate them in record time. Cracked cylinders, gear cases, etc., welded and made good as new. Aluminum, bronze and brass castings of every description. The Adapt Machinery Co., 1624 Wabash Ave., Chicago, Ill.

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MEACHAM COIL EXCHANGE, 13 NORTH
Broadway, Oklahoma City; best equipped shop west of Chicago; coils, magnetos rewound, repaired, exchanged; all work guaranteed; out-of-town work returned same day.

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A-A-A RADIATORS MANUFACTURED
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ALL KINDS OF AUTO RADIATORS,
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Expert repair work on Radiators, Hoods, Fenders, Dashes, Tanks and Drip Pans.
We guarantee all our work.
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CHICAGO MANUFACTURING COMPANY,
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We are the only radiator manufacturers in Chicago making a square tube radiator. New guaranteed cores placed in old radiators. We also manufacture Hoods, Fenders, Tanks and Pans and do guaranteed repair work. Prompt service.

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Phone Calumet 3541.

ILLINOIS AUTO SHEET METAL WORKS, 58-60 E. 16th St., Chicago, Ill.
We are offering the following guaranteed radiators, which we build, at reduced prices:
Ford Model T.....$21.50
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New cores built in old radiators. All repair work guaranteed. Phone Calumet 1191.

ONLY RADIATOR FACTORY IN NORTHwest. Eleven years knowing how. Why send your Radiator down East when you can ship it to us; save time. Express, Freight, Money, and get best workmanship. Prices right. Make new Radiators; allow for old one.
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RADIATORS REPAIRED A SPECIALTY.
We make Fenders, Hoods and Tanks.
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THE M. & L. AUTO SHEET METAL Works rebuild and repair radiators, hoods fenders, tanks, lamps, etc.
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C. E. Larson. (Not inc.) J. C. Beatty.
WELDING OF ALL KINDS OF METALS.
Cast Iron and Aluminum a specialty.
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Experts on aluminum work.
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Autogenous welding of all metals, such as crankcases, cylinders, etc. We positively guarantee all work. Tel. Calumet 3563.

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Welders of all metals.
Aluminum cases a specialty.
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AUTOGENOUS WELDING.
Automobile cylinders and crankcases a specialty. We guarantee the welds.
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All metals brazed and welded are guaranteed. Experts on aluminum welding. Send for circular on aluminum welding. 1615 Wabash Ave. Tel. Calumet 5286.

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Springfield - Boston - Hartford - Holyoke-Bridgeport-Salem. Aluminum cases and cast iron cylinders a specialty. Five shops with five years' successful experience.
Ask for our printed guarantee.

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Cast iron, aluminum and all metals.
National Welding & Mfg. Co., Inc.,
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WE WELD AND ABSOLUTELY
Guarantee
our welds to hold, cylinders (cracked in or outside), crankshafts, aluminum crankcases, transmission cases, housings, etc., by the Oxweld process of welding and cutting metals.
Estimates furnished for job or repair welding and cutting operations of all kinds. Oxweld Acetylene Co., 37th and Jasper Pl., Chicago, Ill. Downtown receiving station, 557-561 W. Jackson Blvd.

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The motorcycle field is well worth your attention; 75,000 new machines in 1912. Leading medium. Motorcycle Illustrated, 51 Chambers St., New York City. Paid circulation over 8,600.

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Owners or dealers; any state, county, city; weekly and monthly supplements at lowest prices. Special lists of electrics, trucks, Fords, Studebakers, Overland, etc.
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NEW ENGLAND AUTO LIST AND TOURist includes weekly lists of all N. E. Auto Owners, Garages, Dealers, etc., with maps. Selected N. E. routes and motor news, $10.00 yearly. 138 Pearl St., Boston. Mass.

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Very best grade of the famous Panamas made, $5 and $10.
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$3 for a sample box of the best cigars made in Philippine Islands.
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Best cigarettes made. Large pkg. containing 25 sml. pkgs., 750 cigarettes, $2. Sent by registered mail free of all duties, on receipt price.
Headquarters for native hand drawn embroideries and mats.
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HOTEL WYCHMERE, EUROPEAN,
Indiana Ave. and Eighteenth St., Chicago, in the very center of the automobile district. 75c to $1.50 per day; with bath $1.00 to $2.00. Clean, comfortable rooms. Fine 40c table d'hote. Take South Side trolley to door.

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Classified Columns

The Trading Center of the Motor Car Industry

Motor Age is read once a week by more people who own, sell, handle or manufacture motor cars and accessories than any other publication in the country.

Motor Age carries more Classified Advertising week in and week out than any other motor car publication. The cost is small, the chances for returns unexcelled.

An advertisement in MOTOR AGE is 100 per cent efficient.

MOTOPHONE

A Mechanically Operated Horn

$12

NO Adjustments Motor Troubles **NO** Electrical Wiring Battery Expense

A loud steady blast is emitted by a slight touch of the lever. As compelling as any motor-driven horn—eliminating the constant care of the electric motor, the recharging of storage batteries, adjustments and cost of maintenance.

Manufactured and guaranteed by

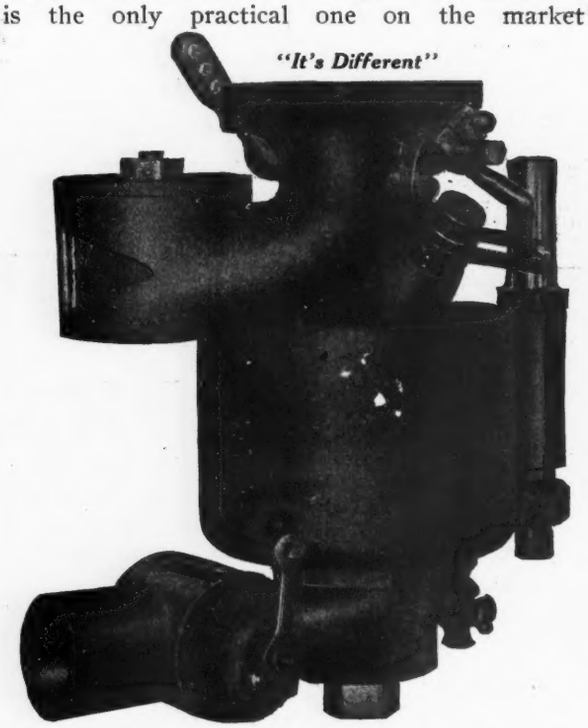
Automobile Supply Mfg. Co.
220 Taaffe Place Brooklyn, N. Y.

What can we do to convince you that the

GALLAGHER CARBURETOR

is the only practical one on the market?

"It's Different"



Gallagher Carburetor Company
1876 BROADWAY, NEW YORK CITY

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Make Your Car Ride Easier

GET 50 to 100 per cent more resiliency and longer life out of your springs by properly lubricating them. You can do it quickly and easily with the—

Knowlson's Spring Leaf Spreader

made of the highest grade drop forging, nickel plated, polished and well finished—adjustable to any size auto spring—separates the leaves just enough to insert the lubricant—does away with the jacking up of the car—used as a clamp for broken springs.

$1.50 all dealers or sent prepaid

Spring Leaf Lubricator Co.
1084 Forest Ave. ANN ARBOR, MICH

DOVER
Garage Specialties
DOVER STAMPING and MFG. CO.
CAMBRIDGE-MASS.

Dealers, write for our complete catalogue of garage accessories
DOVER STAMPING & MFG. CO.
CAMBRIDGE, MASS.
TIRE TESTING TANK

Palmer-Singer

"Brighton-Six"

1914 Models—Prompt Delivery
One Year Guaranty

$2295, fully equipped—*Six cylinders, 45 H. P., electric starting (compressed air starting optional); electric lighting, bull's-eye sidelights flush with dash; 128-inch wheel base; 36x4½-inch tires; quick demountable rims; shock preventers on rear springs; eight day flush type keyless clock; Warner-Stewart speedometer; all gauges, dash fittings and speedometer are mounted flush with sub-dash; tire carrier in rear; clear running boards; clear-vision windshield; mohair top, curtains and boot; gasoline tank located at rear of frame, 20 gallons capacity; splash and pump lubrication; multiple jet carburetor; dual ignition; multiple disc clutch; selective transmission; extra large brakes; extra large wheel spokes, natural finish; deep upholstery; extra long springs; extremely quiet running—the cleanest looking car in the market.*

A Letter from China—and its Meaning

Early last spring, we received a **mail order from Shanghai, China,** for a Palmer-Singer "Brighton-Six." After prompt shipment of the car, we never heard of it again until the following letter was received:

"Shanghai, China, Sept. 5, 1913.

Palmer & Singer Mfg. Co.
Long Island City, N. Y.

Gentlemen:

I desire to send you a line expressing my great appreciation of and the comfort I have had with the 1913 "Brighton-Six" which I purchased from you and which arrived in the spring of this year. It runs very smoothly, giving one the sensation of being towed by a taut steel cable. The self-starter is extremely satisfactory and is not giving me the slightest trouble. As regards the Eiseman magneto, one would never know it was there if it were not that it started the car absolutely without failure each time.

This is the sixth car that I have owned in ten years,—all of them excellent cars for their types and designs; and the experience I gained through them has made me the more able to appreciate the luxury and comfort of the "Brighton."

Wishing you the best of success, I remain,

Yours truly,
(Signed) G. E. Tucker."

There is **no uncertainty,** in the purchase of a Palmer-Singer car. You have every proof of that. In our last advertisement, we repeated the telegram of a "Brighton-Six" owner who, after two years' use of his "Brighton," made a trip across the Continent in it—across deserts and mountains alike—without any repairs, replacements or adjustments whatever.

The reason of such a remarkable performance being possible is the same reason why the two years' later model "Brighton-Six" shipped to China on a **mail order** has proved equally satisfactory.

And consider the price, only **$2,295,** for the most beautiful and completely equipped 6-cylinder car of its type in all the world—one which had abundantly proved to justify its never-challenged slogan of "*The Strongest Built Car in the World.*"

To Dealers:

Palmer-Singer dealers are successful because they sell a successful car.

The Palmer-Singer dealership is a valuable asset—if you can qualify for appointment for your district, your success is assured.

Write today.

Palmer & Singer Manufacturing Company, Factory, Long Island City
NEW YORK CITY

WESTERN BRANCH (Territory, Pittsburgh to Pacific Coast), 2638-40 MICHIGAN AVE., CHICAGO

Motoring Circles
— *In Which do You Belong?*

Those who "WEED CHAIN their cars to safety"

Those who "depend on luck and rubber alone"

With and Without

Weed Anti-Skid Chains

WHEN you have that sickly sinking of your interior that comes with the sudden and entire loss of control inevitably accompanying a bad skid you make a swift mental appeal to Providence and a resolution to use Weed Tire Chains the next time. Why not make the good resolution *now* to always carry Weed Chains in your car and attach them at the first indication of rain, and be absolutely certain of your safety.

Weed Chains are sold for *all* tires by dealers everywhere

Write today for our interesting and instructive booklet regarding the skidding problem. It may save you hundreds of dollars.

WEED CHAIN TIRE GRIP COMPANY, 28 MOORE STREET, NEW YORK, N. Y.

THE NAME WEED ON EVERY HOOK

Manufactured for Canada by
Dominion Chain Co., Ltd., 137 McGill Street, Montreal, Canada

Hupmobile

TWO or three weeks ago Hupmobile dealers from all parts of America and Europe as well came together in convention at the factory to see this new car.

And one man swept the convention by saying what everyone else had thought but had not said.

For ten minutes he had been telling of the hold of the Hupmobile on his big Western territory; and the crowd went wild when he suddenly drawled, by way of climax:—

"Boys—when yuh talk to me about competition—I—don't—know—what—yuh—mean. I never met up with it!"

And do you know, my dear sir—you who are thinking of buying a car—that this dealer merely expressed a condition that exists everywhere?

Stop and think—have you ever heard any but kind words of the Hupmobile?

Isn't it always spoken of separately—by itself?

Isn't it always singled out, and not grouped, as other cars are grouped together in a low priced class? And do you know why?

Why This 1914 Car Is Unique and Alone

The Hupmobile is in a class by itself because it has a sturdy pressed steel frame.

The Hupmobile is in a class by itself because it has a pressed steel Pullman body.

The Hupmobile is in a class by itself because it is the biggest user of aluminum of any moderate priced car.

The Hupmobile is in a class by itself because it is the biggest user of high priced steel of any moderate priced car.

The Hupmobile is in a class by itself because it has a powerful long-stroke motor, 3¼ in. x 5½ in.

The Hupmobile is in a class by itself because it has an individual, distinctive design.

The Hupmobile is in a class by itself, in other words, because by its careful and exhaustive attention to the most intimate details of construction—and by its use throughout of the finest materials obtainable, no matter what the cost, it has justified our belief that it is the best car of its class in the world.

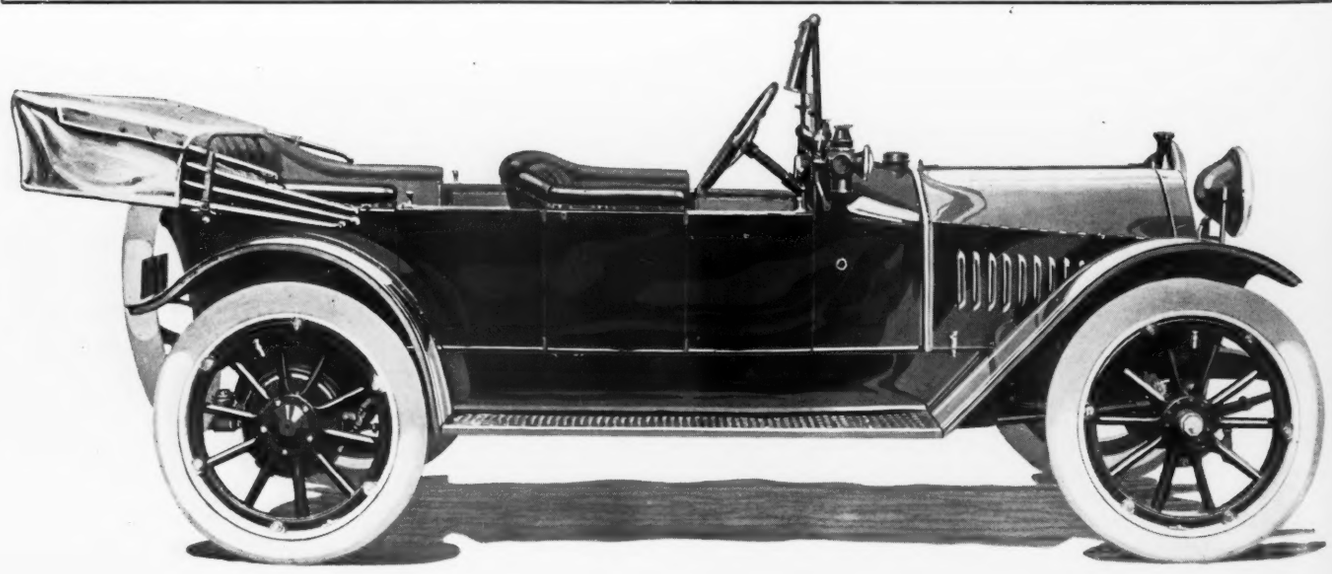
Hupp Motor Car Company, 1228 Milwaukee Avenue, Detroit, Michigan

"32" Touring Car or Roadster—$1050 f. o. b. Detroit
In Canada $1230 f. o. b. Windsor

SPECIFICATIONS

Four-cylinder long-stroke motor, 3¼x5½ inches; unit power plant. Selective type transmission, sliding gears. Center control. Full floating rear axle. 106 inch wheel base. Tires, 32x3½ Q. D. Rear shock absorber. Magneto cover.

EQUIPMENT

Electric horn; rain vision ventilating windshield; mohair top with envelope; Hupmobile Jiffy curtains; speedometer; cocoa mat in tonneau; Prest-O-Lite; oil lamps; tools. Trimmings, black and nickel.

"32" Touring Car or Two-passenger Roadster with Westinghouse two-unit electric generator and starter; electric lights; oversize tires, 33x4; demountable rims, extra rim and tire carrier at rear—$1200 f. o. b. Detroit. In Canada $1380 f. o. b. Windsor